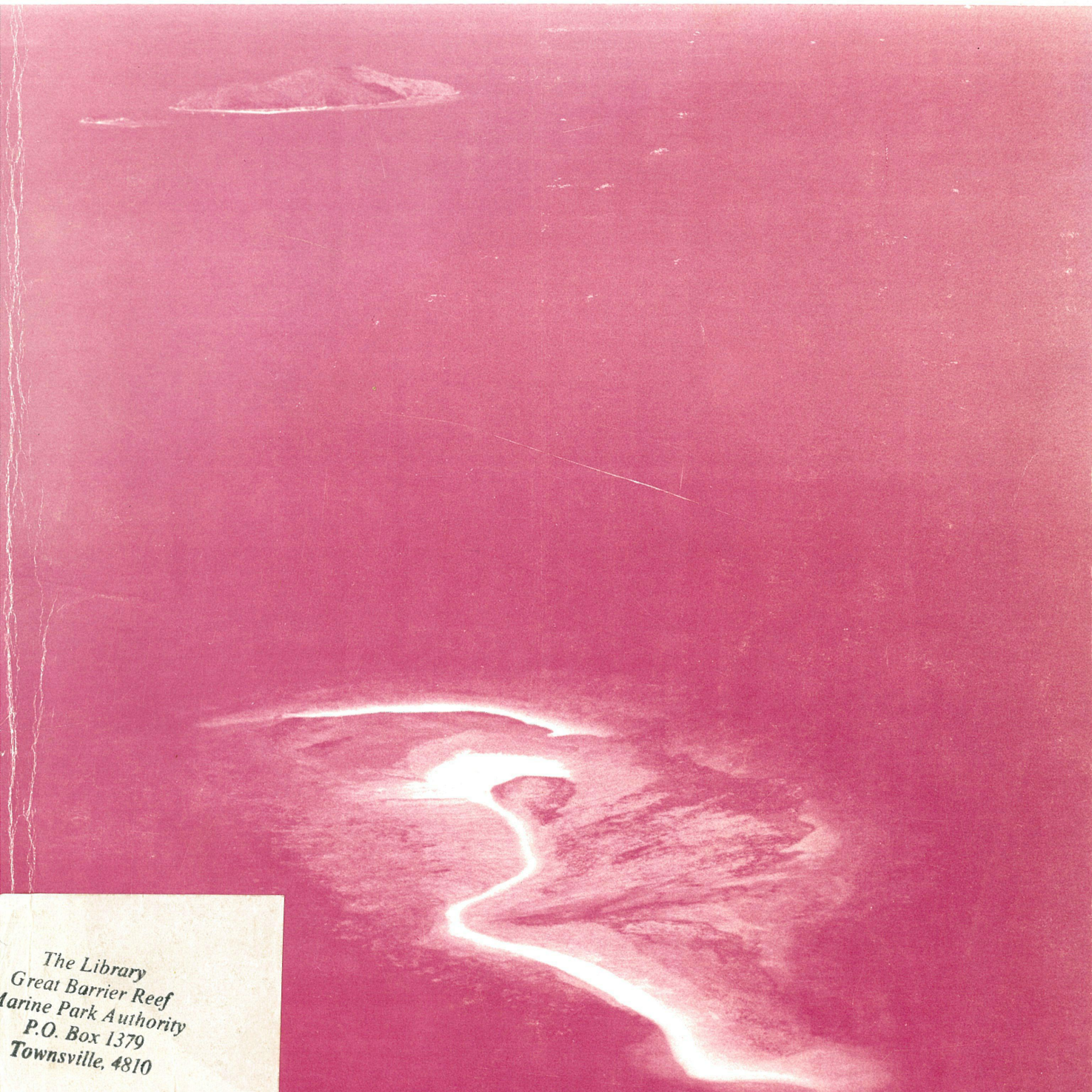
AUSTRALIAN MARINE RESEARCH IN PROGRESS:

GREAT BARRIER REEF REGION 1988-1989



Great Barrier Reef Marine Park Authority
Research Publication

AUSTRALIAN MARINE RESEARCH IN PROGRESS:

GREAT BARRIER REEF REGION 1988-1989

Great Barrier Reef Marine Park Authority

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1988-1989

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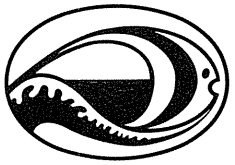
2-68 Flinders Street, Townsville, Qld. 4810

This publication is produced from the information stored in the database AMRIP (Australian Marine Research in Progress) on CSIRONET.



Great Barrier Reef Marine Park Authority

P.O. Box 1379
Townsville, Qld. 4810
Telephone: (077) 81 8811

Contents

INTRODUCTION

The Great Barrier Reef Marine Park Authority, with the assistance of the CSIRO Information Services Unit, has produced this update of the computer-based information system on Australian Marine Research in Progress (AMRIP) for the Great Barrier Reef Region only.

Australian Marine Research in Progress (AMRIP) is a database designed to assist in coordinating the further development in Australia of marine research. It has been developed to encourage the flow of information between individual researchers and research organisations and also to provide the basis for more effective cooperation and coordination between researchers and the users of research in industry and Government. The further development of the database should assist researchers to design projects which complement ongoing research and to identify areas of research which are not being addressed.

The AMRIP database is also publicly available for on-line searching via the CSIRO AUSTRALIS service. It is a valuable resource for the analysis and planning of the conduct of marine research in Australia. The database is updated at least annually; a special hard copy edition for the Great Barrier Reef Region will be published at almost annual frequency.

Management of the AMRIP database is currently coordinated by the Australian Institute of Marine Science with the cooperation of the Commonwealth Scientific and Industrial Research Organisation (CSIRO), Great Barrier Reef Marine Park Authority (GBRMPA) and the Victorian Institute of Marine Sciences (VIMS).

The summaries of marine research projects contained in AMRIP are based directly on information provided by researchers and research organisations. These summaries have been edited only to meet uniform style and presentation standards. No responsibility can be taken for the accuracy of information supplied by contributors.

The Authority thanks the researchers and research organisations who submitted information for inclusion in this update.

Graeme Kelleher
Chairman

HOW TO USE THIS DIRECTORY

The main body of this Directory consists of a numbered series of "Project Summaries". Each summary contains all the information about the project substantially as contributed by the organisation carrying out the research.

Within each subject class, the project summaries are arranged in alphabetical order of main responsible organisation and project title.

The summaries are arranged in groups under subject classes. A complete list of AMRIP's Subject Classification Scheme follows this section.

The summaries are numbered sequentially and these entry numbers are used in the various indexes to refer to particular project summaries. Cross-references refer the reader to entries in other subject categories which may also be of interest. Since each project summary is printed only once (in the most pertinent subject class) these cross-references may be quite important in locating all relevant information.

Although the summaries are mostly self-explanatory, the user should be aware of the following points:

- *summaries which have been highlighed by an asterisk following the entry number have not been amended from last year because no response from the responsible organisation was received.
- *where information under "Period" is absent or incomplete, this reflects the information provided by the contributor; the absence of a completion date often indicates that the project will be continued indefinitely
- *in cases where the sole Project Leader of the project is also the Contact Officer for the project, his name is shown only once under the Project Leader heading
- *where the Contact Officer given is one of the previously listed Project Leaders, his telephone number and other information are not repeated
- *the "Co-ordination with other projects" does not normally include references to co-ordination with projects conducted by the same project leaders or department/organisation

The "Project Summaries" section is followed by a number of indexes. In all of these indexes the numbers refer to project summary numbers and not page numbers.

- *Subject matter searches may be carried out via the permuted "Subject Index", or the separate "Taxonomic Index".
- *The "Organisation Index" contains entries for all organisations and private researchers responsible for projects included in the Directory.
- *The "Project Leader/Contact Officer Index" enables the reader to check on the total involvement of particular project leaders and contact officers before approaching the contact officer regarding a project of particular interest.
- *The "Locality Index" contains the location of the marine area concerned. This information was obtained directly from the contributed material.

The Directory also contains a manually compiled Glossary of Abbreviations, and a list of Geographic Area Codes. These aids are located just before the Project Summaries Section.

SUBJECT CLASSIFICATION SCHEME

Techniques and Equipment
- Data management and manipulation
- Cartography and charting
- Navigation
- Miscellaneous

Physical Sciences
- General
- Oceanography
- Chemistry
- Meteorology and climatology
- Geology
- Oil, gas and mineral exploration

Biomedical Sciences
- General
- Microbiology
- Taxonomy
- Botany
- Algal taxonomy
- Taxonomy of plants other than algae
- Zoology
- Invertebrate taxonomy
- Vertebrate taxonomy
- Physiology
- Ecology
- Checklists
- Medicine
- Biochemistry

Social Sciences
- General
- Anthropology and archaeology
- Biography
- History
- Economics
- Law and legislation
- Recreation and tourism
- Education

Fisheries and Aquaculture
- General
- Resources
- Operations
- Products, processing and marketing

Engineering
- General

GLOSSARY OF ABBREVIATIONS

ABRS	—	Australian Biological Resources Study
ACIAR	—	Australian Centre for International Agricultural Research
ADAB	—	Australian Development Assistance Bureau
AFZ	—	Australian Fishing Zone
AMSTAC-FAP	—	Australian Marine Sciences and Technologies Advisory Committee - Funding Advisory Panel
AIMS	—	Australian Institute of Marine Science
ANPWS	—	Australian National Parks and Wildlife Service
ARGS	—	Australian Research Grants Scheme
ARC	—	Australian Research Council
BMR	—	Bureau of Mineral Resources, Geology and Geophysics
BRIAN	—	Barrier Reef Image Analysis System
CCOP/SOPAC	—	Committee for the Coordination of Joint Prospecting for Mineral Resources in South Pacific Offshore Areas
COTSAC	—	Crown of thorns Starfish Advisory Committee
CSIRO	—	Commonwealth Scientific and Industrial Research Organisation
FAO	—	Food and Agricultural Organization (of the United Nations)
FIRTA	—	Fishing Industry Research Trust Account
FRG	—	Federal Republic of Germany
GBR	—	Great Barrier Reef
GBRC	—	Great Barrier Reef Committee
GBRMPA	—	Great Barrier Reef Marine Park Authority
IR	—	Infra-red
LNG	—	Liquified natural gas
MSTGS	—	Marine Sciences and Technologies Grant Scheme
NERDDP	—	National Energy Research, Development and Demonstration Program
NOAA	—	National Oceanic and Atmospheric Administration
PCB	—	Polychlorinated biphenyls
RAN	—	Royal Australian Navy
R.V.	—	Research Vessel
Scuba	—	Self-contained underwater breathing apparatus
SST	—	Sea Surface Temperature
TOGA	—	Tropical Oceans Global Atmosphere
UNESCO	—	United Nations Educational, Scientific and Cultural Organization
VIMS	—	Victorian Institute of Marine Sciences
VIMSIS	—	Victorian Institute of Marine Sciences Information System
WHOI	—	Woods Hole Oceaographic Institution
XRF	—	X-ray fluorescence (spectrometry)

GEOGRAPHIC AREA CODES

The 200 mile Australian Fishing Zone has been used as the basis for defining geographic area for AMRIP. The map opposite shows how the codes have been assigned.

Codes

B Bass Strait — southern limit 41°S, coast of Tasmania, 143°30'E, 148°30'E, coast of Victoria

G South Australian Gulfs

D Great Australian Bight

S Other South Australian waters

W South-west Australia

E North-west Australia

Y Northern Territory except Gulf of Carpentaria

C Gulf of Carpentaria

J Torres Strait — 10°41'S, 141°20'E, 145°E and outer border of Torres Strait protected zone

R Great Barrier Reef — outer limit defined by GBRMPA act

Z Coral Sea

Q Other Queensland waters

N New South Wales

T Other Tasmanian waters

H Southern Ocean

V Antarctica — south of 60°S

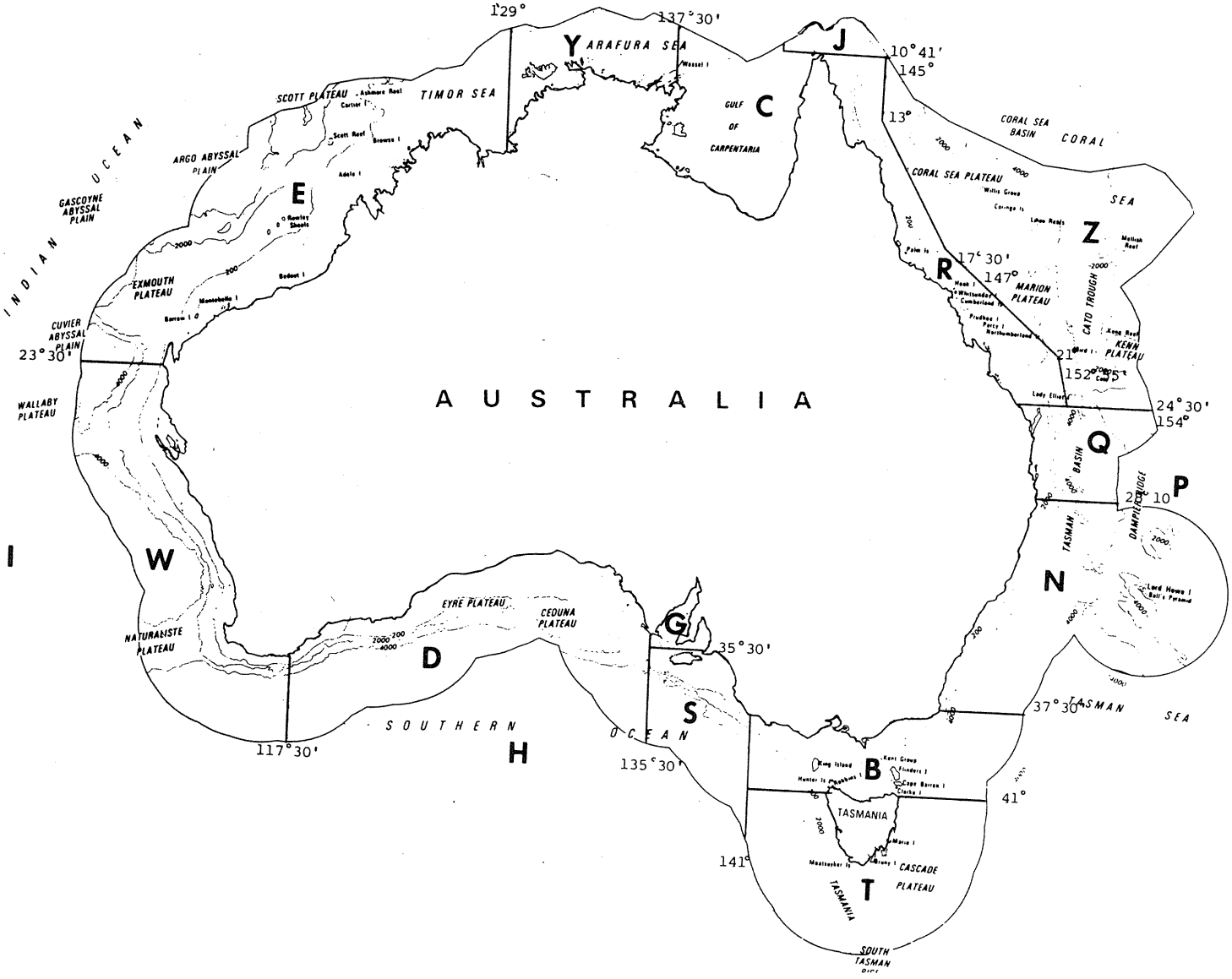
P Pacific Ocean

I Indian Ocean

A Australia — everywhere within 200n mile AFZ limit

O Worldwide excepting areas above

X Not applicable


AUSTRALIA
INDIAN OCEAN
ARAFURA SEA
TIMOR SEA
GULF OF CARPENTARIA
CORAL SEA BASIN
CORAL SEA
CORAL SEA PLATEAU
SCOTT PLATEAU
ARGO ABYSSAL PLAIN
GASCOYNE ABYSSAL PLAIN
CUVIER ABYSSAL PLAIN
EXMOUTH PLATEAU
WALLABY PLATEAU
NATURALISTE PLATEAU
EYRE PLATEAU
CEDUNA PLATEAU
MARION PLATEAU
CATO TROUGH
KENN PLATEAU
LORD HOWE RISE
TASMAN BASIN
TASMAN SEA
SOUTHERN OCEAN
TASMANIA
CASCADE PLATEAU
TASMANIA
SOUTH TASMAN RISE
129°
137°30'
10°41'
145°
13°
17°30'
147°
21°
152°45'
24°30'
154°
23°30'
117°30'
135°30'
35°30'
37°30'
41°
141°
I
W
E
Y
C
J
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B
T

1 Compilation of an information base and pilot study for an inter-disciplinary study of Green Island.

September 1987 -

ORGANIZATIONS:

Great Barrier Reef Marine Park Authority
PO Box 1379
Townsville, Qld 4810

James Cook University of North Queensland,
Department of Marine Biology
Post Office
James Cook University, Qld 4811

James Cook University of North Queensland,
Sir George Fisher Centre for Tropical Marine Studies

PROJECT LEADERS:

Dr L. Zann (077) 818811
Prof J.H. Choat (077) 814111
Ass Prof D. Hopley (077) 814111

CONTACT OFFICER:

Mr I. Baxter (077) 814111

EXPENDITURE:

$20,000 (this year), $38,787 (all years)

OBJECTIVES

To review previous information of Green Island and compile bibliography.
To coordinate planning for the major study.
To initiate pilot studies of fishes and sessile organisms to establish procedures for long term monitoring programs.

METHODOLOGY

1. Review published, unpublished and current research on Green Island.
2. Catalogue aerial photographs.
3. Produce a working map for subsequent sampling and monitoring programs.
4. Design pilot sampling program for sessile organisms and fish.
5. Determine thickness of sand accumulations in seagrass beds.
6. Determine possible changes in growth of corals using x-radiography of cores.
7. Determine changes in geochemistry of corals through time.
8. Examine hydrology of sewage outfall and adjacent reef flat.

STATUS

Pilot studies completed. A report 'Review of current knowledge of Green Island' has been completed and reviewed. Pilot studies of methodologies underway.

CO-ORDINATION WITH OTHER PROJECTS

Coordination with current studies on Green Island by AIMS, Qld DPI, Dr R.B. Johns (Uni Melb), Mr D. Fisk and Ass Prof R. Endean.

LOCALITY: Green Island

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Islands/Biota/Ecology/Geochemistry/Bibliographies/Baseline studies/Research programmes/

[GBRMPA165]

2 Marine Research and Management Information System (MARAMIS).

January 1986 - December 1988

ORGANIZATION:

Great Barrier Reef Marine Park Authority
PO Box 1379
Townsville Qld 4810

PROJECT LEADER:

Dr W. Craik (077) 818811

OBJECTIVE

To produce a current list of marine research and management programs for the south-east Asian region.

METHODOLOGY

Development and distribution of questionnaires on current programs in marine research and management.

STATUS

Completed Project - This project will remain in the computerized Register for another 5 years but will not be included in future issues of the Compendium.

GEOGRAPHIC REGIONS: R,P

MAJOR DESCRIPTORS: Data acquisition/Data collections/Information retrieval/Research programmes/ Resource management/

[GBRMPA136]

See also:

162* ACANTHASTER ECOLOGY, DEMOGRAPHY AND GENETICS: Mathematical models and analyses of existing data.

226 STRUCTURE OF MARINE SYSTEMS: Study of techniques for the modelling of marine ecosystems.

3 Bathymetric mapping program - Great Barrier Reef.

July 1979 -

ORGANIZATION:
Department of Defence, Hydrographic Branch
Operational Facilities Section
PO Box E33
Queen Victoria Terrace, ACT 2600

PROJECT LEADER:
Mr B.H. Willington (062) 525169

CONTACT OFFICER:
Mr C.W. Watson (062) 525084

MANPOWER:
4.00 (this year), 40.00 (all years)

OBJECTIVE
To produce a National Bathymetric Map Series at 1:250 000 scale of the continental shelf of Australia and its Territories.

METHODOLOGY
Radio and GPS position fixing systems, echosounders, and bottom-mounted tide recorders are used to provide soundings, tide corrected to mean sea level, in order to prepare contour maps of the sea floor at 10 metre contour intervals.

STATUS
Survey work continues. Preparation of maps for publication continues. Sounding data is available in manuscript map form, with most available digitally.

CO-ORDINATION WITH OTHER PROJECTS
Conducted in conjunction with Bureau of Mineral Resources, Geology and Geophysics project until 1984.

GEOGRAPHIC REGION: R
SHIP TIME REQUIREMENTS: 103 days - TSMV *Febrina*
MAJOR DESCRIPTORS: Bathymetric surveys/Bottom topography/Mapping/Continental shelves/

[DNDE—002]

4 Overall mapping program for Great Barrier Reef.

January 1986 - November 1988

ORGANIZATION:
Queensland Department of Geographic Information
PO Box 40
Woolloongabba, Qld 4102

PROJECT LEADER:
Mr M. Lambert (07) 8963234

EXPENDITURE:
$59,000 (this year), $66,000 (all years)

MANPOWER:
1.80 (this year), 2.00 (all years)

EXTERNAL SUPPORT:
Coordinator General - $70,000

OBJECTIVES
1. To map the whole of the Great Barrier Reef area at 1:100,000 to provide line maps suitable for administrative planning and zoning of Reef areas in cooperation with the Great Barrier Reef Marine Park Authority.
2. Features to be shown are dryland areas (islands and cays), approximate drying areas, reef drop off and underwater reefal platforms and shoals
3. The present national mapping format for 1:100,000 scale (30° lat x 30° long) is to be used.

METHODOLOGY
Reefal details will be derived from precision processed Landsat imagery.
Underwater reef/shoal shapes will be determined from large format shuttle imagery and from air photographs.
Linework from imagery will be interpreted by the Department and digitized by private consultants.

STATUS
The project, consisting of fifty one (51) sheets, is complete.

Completed Project - This project will remain in the computerized Register for another 5 years but will not be included in future issues of the Compendium.

CO-ORDINATION WITH OTHER PROJECTS

Data in the Cairns area will be included in a pilot project to demonstrate the advantages of a land information system.

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Mapping/Reefs/Aerial surveys/

[QDMS—006]

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5 **Cairns North Hydrographic survey.**

September 1984 - April 1988

ORGANIZATION:
Royal Australian Navy, Hydrographic Office
PO Box 1332
Sydney, NSW 2059

PROJECT LEADER:
Commanding Officer, HMAS Flinders

CONTACT OFFICER:
Commander P.A. Hardy (02) 9254804

OBJECTIVE

To conduct a modern hydrographic survey at the 2 way shipping route and other selected areas of Great Barrier Reef waters between Low isles and Lizard I.

METHODOLOGY

Scale of survey 1:50,000 and larger in some areas. Horizontal control by Argo DM54 and Mini Ranger tied into the Australian Map Grid. Vessels employed will be HMAS *Flinders*, HMAS *Betano* and one 10 m survey boat.

STATUS

Surveying of the 'inner route' to modern standards has been an on-going programme for the RAN since the 1960's. The section between Low Isles and Lizard I is the last area (used by large vessels) which relies on old colonial surveys (1888 in this case).
Away from the shipping route the Barrier Reef Is, to all intents and purposes, unsurveyed.

Completed Project - This project will remain in the computerized Register for another 5 years but will not be included in future issues of the Compendium.

LOCALITIES: Low Isles; Lizard Island

GEOGRAPHIC REGION: R

SHIP TIME REQUIREMENTS: 252 days

MAJOR DESCRIPTORS: Hydrographic surveys/Surveying/

[RANRL–008]

6* **Charting of Claremont Isles.**

January 1988 - March 1988

ORGANIZATION:
Royal Australian Navy, Hydrographic Office
PO Box 1332
North Sydney, NSW 2059

PROJECT LEADER:
Commanding Officer HMAS *Betano*

CONTACT OFFICER:
Commander P.A. Hardy (02) 9254804

OBJECTIVE

To provide modern charting for deep draft route near Claremont Isles.

METHODOLOGY

Scale 1:25000, Control by Mini-ranger. Two ship operation with HMAS *Brunei* assisting.

STATUS

Modern chart required to replace old survey information to satisfy requirements of ships drawing up to 12.2 metres.

Completed Project - This project will remain in the computerized Register for another 5 years but will not be included in future issues of the Compendium.

LOCALITY: Claremont Isles

GEOGRAPHIC REGION: R

SHIP TIME REQUIREMENTS: 80 days

MAJOR DESCRIPTORS: Mapping/Hydrographic surveys/Maps/

[RANHO–004]

7 **Claremont Isles to Heath Reef deep draught route.**

December 1987 - April 1988

ORGANIZATION:
Royal Australian Navy, Hydrographic Office
PO Box 1332
North Sydney, NSW 2059

PROJECT LEADER:
Commanding Officer HMAS *Betano*

CONTACT OFFICER:
Commander R.A. Hardy (02) 9254804

OBJECTIVE

To carry out a hydrographic survey of a potential deep draught route to the west of Hannah, Burkitt and Fife Islands.

METHODOLOGY

Survey at a scale of 1:25000 to modern standards. Horizontal control by mini ranger. Vessels involved HMAS *Betano* , HMAS *Brunei* .

STATUS

This survey is a section of the GBR 'Inner Route' that is of great concern to commercial shipping due to the depth of water available.

Completed Project - This project will remain in the computerized Register for another 5 years but will not be included in future issues of the Compendium.

GEOGRAPHIC REGION: R

SHIP TIME REQUIREMENTS: 15 days

MAJOR DESCRIPTORS: Hydrographic surveys/Water depth/Navigation channels/

[RANHO–006]

See also:

31 Airborne laser bathymetry.

8 Analysis of spectrographic data of coral reef and coastal features, and water masses in the Great Barrier Reef Marine Park.

August 1984 - June 1989

ORGANIZATIONS:

Great Barrier Reef Marine Park Authority
PO Box 1379
Townsville Qld 4810

CSIRO, Division of Water Resources
GPO Box 1666
Canberra, ACT 2601

PROJECT LEADERS:

Dr D. Jupp (062) 464911
Dr D.van.R. Claasen (077) 818811
Dr D. Kuchler

CONTACT OFFICER:

Dr D. Jupp

EXPENDITURE:

$0 (this year), $52,287 (all years)

EXTERNAL SUPPORT:

MSTGS - $55,700

OBJECTIVES

To determine the extent to which computer analysis of satellite and airborne, remotely sensed image data, such as CZCS, LANDSAT MSS and AVHRR, can be used to delineate productive areas of the Great Barrier Reef.
To determine the spectral reflectances of coral reef, coastal and water mass features within the Marine Park.
To establish a spectral data bank for coral reef and coastal system features for use with remotely sensed data as a base for feature interpretation and resource inventory and monitoring purposes.

METHODOLOGY

A pilot study to ascertain the potential of computer analysis of CZCS and LANDSAT data for Great Barrier Reef Region feature delineation was completed in July, 1984. This project involves the direct surface measurement of reflectance values of selected features and will link the results to airborne and satellite scanner data as a preliminary "signature" bank for those features. Field measurements involving handheld and fixed spectrometers are being taken during 1986. The results will be assessed and applied to preprocessed and appropriately formatted remotely sensed data tapes. Adjustments will be effected during the process and the spectral signature bank developed during the final phase of the project.

STATUS

Remotely sensed data tapes have been preprocessed and formatted. Field data have been acquired and are undergoing assessment. Final report to GBRMPA is in preparation.

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Coral reefs/Biological production/Oceanographic data/Remote sensing/Spectral analysis/Data collections/

[GBRMPA113]

9* North-east Australia Satellite Imagery System (NASIS).

ORGANIZATIONS:

James Cook University of North Queensland
Townsville, Qld 4811

Australian Institute of Marine Science
PMB 3
Townsville MC, Qld 4810

Great Barrier Reef Marine Park Authority
PO Box 1379
Townsville, Qld 4810

CSIRO Office of Space Science and Applications (COSSA)
PO Box 225
Dickson, ACT 2602

Queensland Department of Mapping and Surveying

University of Queensland, Department of Geographical Sciences
St Lucia, Qld 4067

PROJECT LEADERS:

Prof P.L. Arlett (077) 814279 (JCU)
Dr J.C. Andrews (077) 789295
Dr P. Otteson (077) 818811
Dr G. Partridge
Dr G. Hill

CONTACT OFFICER:

Prof P.L. Arlett

EXPENDITURE:

$200,000 (this year), $450,000 (all years)

EXTERNAL SUPPORT:

MSTGS - $50,000

OBJECTIVE

To establish a NOAA satellite receiving station in Townsville to cover in particular the north-east Australian region, and a workstation for processing data from this and other satellite systems, in particular, for oceanographic research.

METHODOLOGY

Monitoring from recently launched NOAA satellite on a regular basis. Storage of relevant information on tape. Processing on Arlunya workstation.

STATUS

The receiving dish was set up and became operational in late 1987 on the James Cook University campus. A workstation has been set up at the Australian Institute of Marine Science.

CO-ORDINATION WITH OTHER PROJECTS

Williams and Reichelt: Offshore billfish concentration.
Burrage and Andrews: Mesoscale variability W. equatorial Pacific, Coral Sea and Shelfbreak G.B.R.
Riechelt and Kuchler: Assessment of *A. planci* outbreaks using satellite imagery.
Hopley and Catt: High energy flows related to fringing reef development Cumberland and Northern Scotland Islands.

GEOGRAPHIC REGIONS: Y,C,J,Z,R,Q,P

MAJOR DESCRIPTORS: Satellite sensing/Radio oceanography/Satellites/

[JAMESC118]

10 Techniques for underwater photogrammetry using simple cameras.

May 1979 -

ORGANIZATIONS:

University of Newcastle, Department of Civil Engineering and Surveying
Newcastle, NSW 2308

Australian Institute of Marine Science
Cape Ferguson,
PMB3, MSO,
Townsville, Qld. 4810

Hunter District Water Board
Survey Section
P.O. Box 5171B
Newcastle West, N.S.W. 2302

PROJECT LEADERS:

Assoc Prof J.G. Fryer (049) 685628
Mr M.H. Elfick (049) 685507
Dr T. Done (077) 789211
Mr R. Andrews (049) 267334

CONTACT OFFICER:

Assoc Prof J.G. Fryer

EXTERNAL SUPPORT:

ARGS - $30,000

OBJECTIVE

To develop photogrammetric techniques for measurement of underwater objects and for mapping underwater features using non-metric cameras.

METHODOLOGY

Examine distortion characteristics of underwater cameras such as the NIKONOS 3.
Examine error propagation in stereo pairs of underwater photography.
Develop techniques for control of blocks of underwater stereo photos.
Develop standard mapping techniques using both underwater and very low level aerial photography.
Develop measurement techniques using a small analytical stereoplotter designed specifically for 35mm photography.
Examine methods of "through-water" photogrammetry.

GEOGRAPHIC REGIONS: N,R

MAJOR DESCRIPTORS: Photogrammetry/Underwater photography/Mapping/Underwater cameras/

[UNINEW002]

11 Sea noise in Australian waters.

July 1986 - June 1992

ORGANIZATION:
Defence Science and Technology Organisation, Maritime Systems Division
PO Box 706
Darlinghurst, NSW 2010

PROJECT LEADER:
Dr D.H. Cato (02) 6921483

EXPENDITURE:
$200,000 (this year)

MANPOWER:
3.00 (this year)

OBJECTIVES

1. To model theoretically noise generation by sea surface motion to determine the characteristics of the resulting noise field in the ocean.
2. To test the theory by experiments in laboratory and at sea.
3. To determine mechanisms of noise generation in breaking waves in a wave tank.
4. To study marine biological choruses in Australian waters including characteristics and sources.
5. To study humpback whale songs in Australian waters.

METHODOLOGY

Theoretical work is an extension of Lighthill's theory of noise generation in fluids applied to sea surface.
Experiments at sea comprise measurements of ambient noise with hydrophone and amplifier on sea floor with cable ashore, wind speed and wave height from buoys. Analysis of noise and wave height spectra.
Wave tank experiments have hydrophone in tank and correlate noise with events in wave.
Biological noise studies combine noise recordings with hydrophone from boats and biological observations.

STATUS

Theory has been successfully applied to noise at frequencies below about 10 Hz and is being applied to higher frequency mechanisms.
There has been some data collection at sea and analysis is in progress.
Data on magnetic tape or cassettes.

GEOGRAPHIC REGIONS: C,E,J,Q,R,Z

SHIP TIME REQUIREMENTS: 15 days

MAJOR DESCRIPTORS: Noise (sound)/Sea water/Wave breaking/Hydrophones/Biological noise/Mammals/

TAXONOMIC TERMS: Megaptera novaeangliae

[RANRL-012]

12* Australian shoreface project.

January 1986 -

ORGANIZATION:
University of Sydney, Coastal Studies Unit
Department of Geography
Sydney, NSW 2006

PROJECT LEADER:
Dr A.D. Short (02) 9693625, 3880

EXTERNAL SUPPORT:
MSTGS - $20,400 (1986)

OBJECTIVE

To empirically develop a series of shore face models capable of describing spatial and temporal variations in Australian sandy shorefaces through the range of wave and tide regimes and sediment combinations.

METHODOLOGY

To achieve these aims field experiments will be conducted in micro, meso and macro tidal sites to investigate the following:
1. Morphology - spatial and temporal variability. 2. Hydrodynamics - waves, tides, currents. 3. Sediment dynamics. 4. Sediment properties. 5. Bedforms. 6. Primary structures and shallow stratigraphy. 7. In and epi fauna. 8. Facies. 9. Modern shore face evolution.

STATUS

Field experiment in eastern Port Phillip January-February 1986, and central Queensland coast August 1987. All analysis of sediments, cores, survey data complete. Awaiting results of radiocarbon dating. Field work schedules for Halifax and Harvey Bay, Queensland 1988.

CO-ORDINATION WITH OTHER PROJECTS

Queensland Geological Survey, Coastal and Marine Section, Queensland Beach Protection Authority.

GEOGRAPHIC REGIONS: R,Q,N,B,G,E,Y,C

SHIP TIME REQUIREMENTS: 20 days

MAJOR DESCRIPTORS: Coasts/Models/Hydrodynamics/Coastal morphology/Sediment dynamics/

[UNISYD103]

13 COASTAL PELAGIC RESOURCES: Physical environment: satellite imagery.

June 1987 - June 1991

ORGANIZATION:

Australian Institute of Marine Science
PMB No. 3
MC Townsville,
Qld 4810.

PROJECT LEADERS:

Dr R. Reichelt (077) 789211
Dr D. Burrage
Dr D. Williams

CONTACT OFFICER:

Dr R. Reichelt

OBJECTIVE

To determine spatial and temporal variation in water colour, sea surface temperature and chlorophyll analogues in relation to circulation models and distributions and abundance of billfish-baitfish.

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Surface temperature/Water colour/Satellite sensing/Spatial variations/Temporal variations/Bait fish/

TAXONOMIC TERMS: Clupeidae

[AIMS10602]

14 CONNECTIVITY IN MARINE SYSTEMS: Circulation between reefs.

June 1986 - June 1991

ORGANIZATIONS:

Australian Institute of Marine Science
PMB No. 3
MC Townsville,
Qld 4810.

James Cook University of North Queensland

University of Western Australia

PROJECT LEADERS:

Dr E. Wolanski (077) 789211
Dr D. Burrage
Dr J. Nihoul (Belgium)
Dr T. Lee (USA)
Dr J. Imberger (UWA)
Dr W. Hamner (USA)
Dr R. Falconer (UK)

CONTACT OFFICER:

Dr E. Wolanski

OBJECTIVE

To examine the nature of connectivity between reefs, using field data of material diffusion between reefs and numerical models of reef-induced circulation, towards an understanding of the significance of mass coral spawning events in the dynamics of coral reef ecosystems.

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Coral reefs/Coral/Spawning/Marine ecology/Ocean circulation/

[AIMS40301]

15 CONNECTIVITY IN MARINE SYSTEMS: Large-scale dispersal patterns.

June 1987 - June 1990

ORGANIZATION:

Australian Institute of Marine Science
PMB No. 3
MC Townsville,
Qld 4810.

PROJECT LEADERS:

Dr E. Wolanski (077) 789211
Dr A. Bratkovich (USA)
Dr T. Lee (USA)

CONTACT OFFICER:

Dr E. Wolanski

OBJECTIVE

To compare the outer shelf dynamics of the US east coast and the GBR to parameterize large-scale dispersion patterns controlled by slope currents towards a deeper understanding of circulation between reefs.

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Coral reefs/Ocean circulation/Slope currents/Dispersion/

[AIMS40304]

16 **FORCINGS OF MARINE SYSTEMS: Oceanic and meteorological forcing of the Great Barrier Reef.**

June 1986 - June 1989

ORGANIZATIONS:

Australian Institute of Marine Science
PMB No. 3
MC Townsville,
Qld 4810.

CSIRO, Division of Oceanography

PROJECT LEADERS:

Dr D. Burrage (077) 789211
Dr J. Church

CONTACT OFFICER:

Dr D. Burrage

OBJECTIVE

To complete the analysis of the energy levels and cospectra of currents, temperatures, sea level pressure and winds near the shelfbreak and in the Queensland Trough, using linear systems models, towards an understanding of across and along-shelf variations in the intensity of mesoscale forcing and response of the Great Barrier Reef lagoon.

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Mesoscale features/Current forces/Shelf dynamics/

[AIMS40401]

17 **FORCINGS OF MARINE SYSTEMS: Operational numerical models of Great Barrier Reef currents.**

June 1986 - December 1988

ORGANIZATIONS:

Australian Institute of Marine Science
PMB No. 3
MC Townsville,
Qld 4810.

James Cook University of North Queensland

Great Barrier Reef Marine Park Authority

PROJECT LEADERS:

Dr J. Andrews (077) 789211
Dr D. Williams
Dr P. Sammarco
Dr L. Bode (JCU)
Dr M. Heron (JCU)
Dr W. Craik (GBRMPA)

CONTACT OFFICER:

Dr J. Andrews

OBJECTIVE

To develop an integrated portfolio of both research and operational numerical models of ocean circulation on continental shelves, using a suite of space and time scales important to tropical ecosystems, towards the provision of a practical predictive service for marine ecosystem managers.

STATUS

Completed Project - This project will remain in the computerized Register for another 5 years but will not be included in future issues of the Compendium.

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Tropical oceanography/Environmental monitoring/Ocean circulation/ Coral reefs/Mathematical models/

[AIMS40405]

18 **FORCINGS OF MARINE SYSTEMS: The tides of the Great Barrier Reef.**

June 1986 - June 1991

ORGANIZATIONS:

Australian Institute of Marine Science
PMB No. 3
MC Townsville,
Qld 4810.

James Cook University of North Queensland

PROJECT LEADERS:

Dr J. Andrews (077) 789211
Dr L. Bode

CONTACT OFFICER:

Dr J. Andrews

OBJECTIVE

To monitor the tides of the GBR and to determine the spatial variability in tides within and between regions, using a network of reference tide gauges in long-term deployments within 4 subregions of the GBR, towards a capacity to predict the tides at any location in the GBR.

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Coral reefs/Tidal prediction/Tidal analysis/Spatial variations/

[AIMS40404]

19 FORCINGS OF MARINE SYSTEMS: Weather stations on the Great Barrier Reef.

June 1986 - June 1991

ORGANIZATION:

Australian Institute of Marine Science
PMB No. 3
MC Townsville,
Qld 4810.

PROJECT LEADERS:

Dr J. Andrews (077) 789211
Dr M. Beecher
Dr M. Pichon

CONTACT OFFICER:

Dr J. Andrews

OBJECTIVE

To develop a network of real-time weather stations throughout the GBR region and to make the weather data so obtained available to end users.

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Coral reefs/Meteorological data/Weather/

[AIMS40406]

20 Installation of tide gauges: collaborative research.

January 1985 - December 1988

ORGANIZATIONS:

Australian Institute of Marine Science
PMB 3
MSO Townsville Qld 4810

Great Barrier Reef Marine Park Authority
PO Box 1379
Townsville Qld 4810

Bureau of Meteorology
PO Box 1289K
Melbourne Vic 3001

James Cook University of North Queensland
Department of Civil and Systems
Engineering

PROJECT LEADERS:

Dr J.C. Andrews (077) 789211
Mr I.M. Dutton (077) 818811
Mr T. Savory (03) 6694496
Dr L. Bode (077) 814111

CONTACT OFFICER:

Mr I.M. Dutton

EXPENDITURE:

$20,000 (this year), $42,000 (all years)

OBJECTIVE

To purchase and install tide gauges to monitor tides in the Great Barrier Reef Region and to gather long term tidal data in the Western Pacific in association with the Westpac program.

METHODOLOGY

Collaborative installation and monitoring of tide gauges.

STATUS

Tide gauges purchased and installed.

Completed Project - This project will remain in the computerized Register for another 5 years but will not be included in future issues of the Compendium.

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Tides/Measuring devices/Oceanographic data/

[AIMS—011]

21 Large scale physical/reef oceanography.

June 1986 - June 1989

ORGANIZATIONS:
Australian Institute of Marine Science
PMB No. 3
MC Townsville,
Qld 4810.
CSIRO

PROJECT LEADERS:
Dr J. Veron (077) 789211
Dr M. Inoue (USA)
Dr G. Myers (CSIRO)

CONTACT OFFICER:
Dr J. Veron

OBJECTIVES

(1) To determine the interconnectivity of South Pacific reefs and also the role of temperature and of large scale perturbations in controlling the distribution of reef corals.
(2) To determine the role of oceanic conditions in controlling distribution patterns of Australian reef corals.

GEOGRAPHIC REGIONS: R,Z,P

MAJOR DESCRIPTORS: Coral/Coral reefs/Geographical distribution/Tropical oceanography/ Temperature/

[AIMS20301]

22 MICRO-SCALE REEF WATER DYNAMICS: Dynamics of reef-water interface.

June 1986 - December 1988

ORGANIZATIONS:
Australian Institute of Marine Science
PMB No. 3
MC Townsville,
Qld 4810.
University of Western Australia
Australian National University

PROJECT LEADERS:
Dr E. Wolanski (077) 789211
Dr J. Imberger (UWA)
Dr S. Turner (UWA)
Dr G. Ivey (ANU)
Dr T. Shay (UWA)

CONTACT OFFICER:
Dr E. Wolanski

OBJECTIVE

Dynamics at the reef-water interface were studied in order to resolve the fate of water touching reef margins and the resulting mixing properties of the turbulent boundary layer.

STATUS

Completed Project - This project will remain in the computerized Register for another 5 years but will not be included in future issues of the Compendium.

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Coral reefs/Turbulent boundary layer/Interfaces/Mixing processes/

[AIMS20503]

23 MICRO-SCALE REEF WATER DYNAMICS: Wave dynamics.

June 1986 - June 1992

ORGANIZATIONS:
Australian Institute of Marine Science
PMB No. 3
MC Townsville,
Qld 4810.
University of Queensland
Australian Defence Force Academy

PROJECT LEADERS:
Dr E. Wolanski (077) 789211
Dr T. Done
Dr M. Gourlay (U Qld)
Dr I. Young (ADFA)
Dr R. Nelson (ADFA)

CONTACT OFFICER:
Dr E. Wolanski

EXTERNAL SUPPORT:
GBRMPA

OBJECTIVE

Wave dynamics are presumed to play a major role in reef community structure, yet wave dynamics have not been studied on the GBR. Wave climate will be studied across the width of the GBR and across a platform reef (Rib Reef).

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Coral reefs/Wave climate/Wave dynamics/

[AIMS20502]

24 STRUCTURE OF MARINE SYSTEMS: Coral Sea mode structure and volume fluxes.

June 1986 - June 1989

ORGANIZATIONS:

Australian Institute of Marine Science
PMB No. 3
MC Townsville,
Qld 4810.

CSIRO, Division of Oceanography

University of Sydney

PROJECT LEADERS:

Dr J. Andrews (077) 789211
Dr M. Furnas
Dr J. Church (CSIRO)
Dr M. Tomczak (U Syd)

CONTACT OFFICER:

Dr J. Andrews

OBJECTIVE

To quantify the volume budget and mode structure in the Coral Sea, using previously collected density and nutrient data of the Coral Sea and in particular its western region, towards an understanding of the very long period forcing of the western boundary flows, especially the seasonal to steady East Australian Current and GBR flows.

GEOGRAPHIC REGIONS: R,Z

MAJOR DESCRIPTORS: Western boundary currents/Volume transport/Coral reefs/

[AIMS40203]

25 VARIABILITY IN MARINE SYSTEMS: Mesoscale variability of current circulation in the Coral Sea and Great Barrier Reef lagoon.

June 1986 - June 1989

ORGANIZATIONS:

Australian Institute of Marine Science
PMB No. 3
MC Townsville,
Qld 4810.

CSIRO, Division of Oceanography

PROJECT LEADERS:

Dr D. Burrage (077) 789211
Dr M. Furnas
Dr J. Church (CSIRO)

CONTACT OFFICER:

Dr D. Burrage

OBJECTIVE

To investigate the mesoscale (approx. 100 km) variability in the Coral Sea, its association with the East Australian Current and effects on the circulation of the Great Barrier Reef lagoon, using reconnaissance XBT/CTD profiles and Lagrangian drifter and Acoustic Doppler velocity data, merged with the thermal imagery from NOAA satellites.

GEOGRAPHIC REGIONS: Z,R

MAJOR DESCRIPTORS: Coral reefs/Current observations/Upwelling/Surface temperature/ Mesoscale features/

[AIMS40101]

26 VARIABILITY IN MARINE SYSTEMS: Long term variability of the thermal structure of the Coral Sea, Great Barrier Reef lagoon and Gulf of Carpentaria.

June 1986 - June 1991

ORGANIZATIONS:

Australian Institute of Marine Science
PMB No. 3
MC Townsville,
Qld 4810.

CSIRO, Division of Oceanography

PROJECT LEADERS:

Dr D. Burrage (077) 789211
Dr D. Williams
Dr M. Inoue (USA)
Dr G. Meyers (CSIRO)

CONTACT OFFICER:

Dr D. Burrage

OBJECTIVE

To monitor the seasonal and interannual variability of the thermal structure and geostrophic currents in the upper 500 m of the Coral Sea and in the Great Barrier Reef lagoon using intensive hydrographic surveys, ship-of- opportunity XBT transects and NOAA satellite data to support ecological studies of marine ecosystems.

GEOGRAPHIC REGIONS: R,Z

MAJOR DESCRIPTORS: Coral reefs/Thermal structure/Ocean circulation/Mesoscale features/ Coastal zone/

[AIMS40102]

27 Coastal circulation due to alongshore pressure gradients.

- December 1988

ORGANIZATION:

CSIRO, Division of Oceanography
Marine Laboratories
GPO Box 1538
Hobart, Tas 7001

CONTACT OFFICER:

Dr J.A. Church Telephone: (002) 20 6222
Telex: 57182 Fax: (002) 24 0530

OBJECTIVE

To determine the relative importance of wind stress and alongshore pressure gradients in determining the low frequency (period > 20 days) currents on the continental shelf of the Great Barrier Reef from 19° to 22°S.

METHODOLOGY

In the southern Great Barrier Reef lagoon the mean flow is to the southeast even though the mean wind stress is to the northwest. Presumably then this flow must be driven by other factors. The prime candidate is the pressure gradient imposed on this flow by large-scale steric height field in the western Coral Sea. The objectives of this program are:- (a) To determine the relative importance of wind stress and alongshore pressure gradients in determining the low frequency (period > 20 days) currents on the continental shelf of the Great Barrier Reef from 19° to 22°S. b) To compare the observed contributions with those expected from theoretical considerations. c) To parameterise the very low frequency circulation by consideration of the mean (time independent) equations of motion representing wind-forced and open ocean effects.

GEOGRAPHIC REGIONS: R,Z

MAJOR DESCRIPTORS: Wind stress/Shelf dynamics/Continental shelves/Pressure gradients/

[CM-30CB03]

28 Coral Sea circulation.

- December 1988

ORGANIZATION:

CSIRO, Division of Oceanography
Marine Laboratories
GPO Box 1538
Hobart, Tas 7001

CONTACT OFFICER:

Dr J.A. Church Telephone: (002) 20 6222
Telex: 57182 Fax: (002) 24 0530

OBJECTIVE

To obtain direct observations of the southward near surface current and the northward undercurrent beyond the seaward edge of the Great Barrier Reef at 10°S. An attempt will also be made to trace the undercurrent upstream (southward) by measuring the density (and associated chemical) field along sections perpendicular to the Great Barrier Reef.

METHODOLOGY

Offshore from Townsville, a channel some 1100 meters deep separates the Great Barrier Reef from the Queensland Plateau. In this channel, there is a southward near surface (0-300 meters) current, and a northward undercurrent below this depth. The maximum in the undercurrent seems to occur at about 600 meters. There is some indication that there is a cell structure in this northward undercurrent. Even though we have a general picture of the undercurrent, we have few details of its time and space variability. The objectives of this program are:- a) To obtain direct observations of the southward near surface current and the northward undercurrent by deploying six current meter moorings on the shelf slope and in the channel between Myrmidon Reef and Flinders Reef. b) To determine the density field

and the associated chemical distribution on the section between Myridon Reef and Flinders Reef. An attempt will also be made to trace the undercurrent upstream (southward) from this section by two additional sections from the GBR to at least 100 nm seaward. c) To determine the current field at each of these sections using an acoustic doppler profiler.

LOCALITIES: Myrmidon Reef; Flinders Reef

GEOGRAPHIC REGIONS: Z,R

MAJOR DESCRIPTORS: Surface circulation/Shelf dynamics/Undercurrents/Density field/

[CM-30CB05]

29 Modelling of stratified seas, including internal waves and tides.

January 1986 - December 1988

ORGANIZATION:

CSIRO, Division of Oceanography
Marine Laboratories
GPO Box 1538
Hobart, Tas 7001

CONTACT OFFICER:

Dr P.D. Craig Telephone: (002) 20 6222 Telex: 57182 Fax: (002) 24 0530

OBJECTIVES

To investigate, using models, the dynamics of low-frequency internal waves. Specifically:
1) to develop an analytic model to identify the space and time scales associated with internal motion;
2) to model internal tidal generation and propagation, particularly on the North-West Shelf.

METHODOLOGY

An analytic model, period in both space and time, is being developed to investigate free and forced motion in stratified continental shelf waters. The model enables the scales of the motion to be identified, thereby leading to a better understanding of the stratified dynamics. The model will aid interpretation of output from more complex numerical models, and provides solutions against which the numerical models can be tested.
A stratified numerical model is being developed to study both wind- driven (project EA01) and tidal motion. On the Northwest Shelf, internal tides lead to high velocities that are of both engineering and biological significance. The numerical model is to be used to extend earlier studies of the internal tides, to examine the influence of friction and three-dimensionality on the tides. The project will involve analysis of extensive data sets collected by offshore industry, and the results of an internal tidal experiment conducted on RV *Franklin* cruise FR4/87. Other in-house data sets, the interpretation of which may be aided by the model, are from the Great Barrier Reef, where internal tides appear to cause significant nutrient fluxes onto the shelf, and from the 150°E mooring of the Western Equatorial Pacific Ocean Circulation Study, where anomalous internal tides were observed in 5000 m of water.

GEOGRAPHIC REGIONS: E,R,P

MAJOR DESCRIPTORS: Internal waves/Tidal models/Wave dynamics/Stratification/Shelf seas/

[CM-30EA04]

30 Coastmap north Queensland.

August 1987 - June 1989

ORGANIZATION:

Defence Science and Technology Organisation, Maritime Systems Division
PO Box 706
Darlinghurst, NSW 2010

PROJECT LEADER:

Dr P.J. Mulhearn (02) 6921480

OBJECTIVE

Investigate water clarity and other environmental variables which control it, in coastal waters of north Queensland. Relate Landsat data to *in-situ* water clarity.

STATUS

Measurements were obtained in Torres Strait in February and March 1988 and a report is in preparation. Analysis of Landsat imagery is in progress.

CO-ORDINATION WITH OTHER PROJECTS

Data collection in March 1988 and some of the subsequent analysis of samples has been in conjunction with Dr Peter Harris of Ocean Sciences Institute, University of Sydney.

GEOGRAPHIC REGIONS: R,J

MAJOR DESCRIPTORS: Coastal waters/Water quality/Mapping/Environmental factors/Satellite photography/

[DSTO—010]

31 Airborne laser bathymetry.

January 1975 -

ORGANIZATIONS:

Defence Science and Technology Organisation, Surveillance Research Laboratory
GPO Box 2151,
Adelaide, SA 5001

Royal Australian Navy, Hydrographic Office
PO Box 1332
North Sydney, NSW 2059

PROJECT LEADERS:

Mr M.F. Penny (08) 2596290
Captain J. Compton (062) 655009

CONTACT OFFICER:

Mr M.F. Penny

OBJECTIVE

To develop an airborne laser depth sounding system suitable for hydrographic survey in shallow coastal waters. To survey at a rate of 50 sq km/hour from an aircraft flying at 70 m/sec with a 10 m spacing between soundings. To cover the depth range of 2 to 30 m in average coastal waters but with a capability of measuring to 50 m. To develop data processing methods for systematic analysis of large volumes of data and reduction to a scale suitable for chart production.

METHODOLOGY

The development programme required two experimental systems to be built, these were known as WRELADS I and II. The latter installed in a RAAF DC3 aircraft, has completed a 550 hour test flight programme. Emphasis was placed initially on optimising hardware and this was followed by exhaustive performance and accuracy investigations over a calibrated range in Gulf St Vincent. WRELADS II was also evaluated in North Queensland coastal waters and briefly off Fremantle in Western Australia.

STATUS

The requirements for the system, as set by the RAN, have been met. A large data bank has been established and processing methods developed and validated. The R&D Programme has been completed and reported in *Applied optics* Vol 25, No 13 (July 1986). Hardware designs have been documented and processing algorithms specified. This documentation with other contributions will define an operational system for NAVY. This system has been designed for Fokker Friendship installation and is known as LADS. The design and manufacturing data package for LADS is complete and tenders for the manufacture, integration and airborne test of LADS are currently being evaluated.

LOCALITIES: Gulf St Vincent; Fremantle

GEOGRAPHIC REGIONS: G,W,R

MAJOR DESCRIPTORS: Lasers/Bathymetric surveys/Aerial surveys/Data processing/

[DSTO—003]

32 Review of physical oceanographic models, their representation of the physical oceanography and their application to the management of the Great Barrier Reef.

November 1987 - June 1988

ORGANIZATIONS:

Great Barrier Reef Marine Park Authority
PO Box 1379
Townsville, Qld 4810

Steedman Limited (Subcontract)
384 Rokeby Road
Subiaco, WA 6008

PROJECT LEADERS:

Dr W. Craik (077) 818811
Dr R.K. Steedman (09) 3818522

CONTACT OFFICER:

Dr W. Craik

EXPENDITURE:

$7,700 (all years)

OBJECTIVE

To identify and describe physical oceanographic models that have been developed and are suitable for the Great Barrier Reef region; to assess whether they can address adequately management issues; to advise on suitable models; to advise on a standard text to validate the performance of models; to identify and assess the adequacy of data and to advise on further research.

METHODOLOGY

Information to be sought through a questionnaire.

STATUS

Project completed. Data and report will be confidential to the Great Barrier Reef Marine Park Authority. Some aspects may be published.

Completed Project - This project will remain in the computerized Register for another 5 years but will not be included in future issues of the Compendium.

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Coral reefs/Physical oceanography/Environment management/Models/

[GBRMPA168]

33* **Predicting wave climate inside a reef lagoon.**

January 1987 - January 1989

ORGANIZATION:

James Cook University of North Queensland,
Department of Civil and Systems Engineering
Townsville, Qld 4811

PROJECT LEADER:

Mr T.A. Hardy (077) 814830

EXPENDITURE:

$32,000 (this year), $40,000 (all years)

EXTERNAL SUPPORT:

Barrier Reef Holdings

OBJECTIVE

To predict wave climate inside John Brewer Reef based on wind prediction and tide level.

METHODOLOGY

Two wave measuring instruments will be deployed at John Brewer Reef, a waverider windward of the reef and a pressure gauge inside the reef lagoon. Data from these instruments will be correlated with wind data to derive predictive equations for waves inside the lagoon based on predicted wind speed.

STATUS

The instruments have been purchased and will be deployed early in 1988.

CO-ORDINATION WITH OTHER PROJECTS

There will be close coordination with the MSTG Project "Wave Decay and Transformation through the Great Barrier Reef", University of Queensland.

LOCALITY: John Brewer Reef

GEOGRAPHIC REGION: R

SHIP TIME REQUIREMENTS: 1 day

MAJOR DESCRIPTORS: Wave climate/Lagoons/Wind measurement/Tides/Wave forecasting/

[JAMESC111]

34* **Three dimensional numerical modelling of circulation in the Great Barrier Reef region.**

March 1987 - March 1990

ORGANIZATION:
James Cook University of North Queensland,
Department of Civil and Systems Engineering
Townsville, Qld 4811

PROJECT LEADERS:
Dr J.R. de Silva Samarasinghe (077) 814752
Dr L. Bode (077) 814214

CONTACT OFFICER:
Dr L. Bode

EXPENDITURE:
$13,500 (this year), $13,500 (all years)

MANPOWER:
3.00 (this year), 3.00 (all years)

EXTERNAL SUPPORT:
National Research Fellowships Scheme - $27,000 (per year)

OBJECTIVE
To develop three dimensional models of the tidal and wind-driven circulation of the Great Barrier Reef region. Once the models are in operation so that they can predict the above circulations with accuracy it is expected to extend their predictive capabilities to deal with the ecological and pollution problems.

METHODOLOGY
The technique is to split the primitive hydrodynamic equations into a set of depth-averaged equations and a z- dependent equation. Then this series of equations is expressed in a sigma-coordinate system in order to facilitate vertical integration.

STATUS
The model is now being tested in its present simplified form with a single tidal constituent as the input.

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Wind-driven circulation/Ocean circulation/Tidal effects/Mathematical models/

[JAMESC115]

35* Two- and three-dimensional modelling for the Great Barrier Reef region.

January 1988 - December 1990

ORGANIZATION:
James Cook University of North Queensland,
Department of Civil and Systems Engineering
Townsville, Qld 4811

PROJECT LEADER:
Dr L. Bode (077) 814214

EXPENDITURE:
$73,300 (this year), $73,300 (all years)

MANPOWER:
2.00 (this year), 2.00 (all years)

EXTERNAL SUPPORT:
MSTGS - $73,300

OBJECTIVE
To develop new techniques for two-dimensional and three-dimensional numerical hydrodynamic models of water circulation in the Great Barrier Reef (GBR) region, and to develop applications of these modelling techniques to physical and biological problems.

METHODOLOGY
In the area of two-dimensional modelling the basic methodology involves the incorporation, on a macroscopic scale, of the reef matrix of the GBR region. This work has been submitted for publication. The three-dimensional model uses sigma-coordinates in the vertical. At present, the model is being applied to homogeneous fluids, with a simple representation of the vertical turbulent mixing of momentum. Future developments are planned to use more realistic vertical eddy viscosities, particularly in the surface and bottom boundary layers, and to extend the model to cover the effects of stratification.

STATUS
Work on two-dimensional modelling is continuing as an extension of the earlier project, "Numerical modelling of Great Barrier Reef circulation". These models are in the process of validation for the area around Hydrographer's Passage off Mackay. Development of the three-dimensional model is continuing in association with a National Research Fellow. Testing of this model against analytical solutions is proceeding, prior to application to the GBR region.

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Coral reefs/Mathematical models/Hydrodynamics/Water circulation/

[JAMESC117]

36 Wave data collection along the Queensland coastline.

April 1974 -

ORGANIZATION:
Queensland Beach Protection Authority
G.P.O. Box 2595,
Brisbane, Qld 4001

PROJECT LEADER:
Mr A.T. Butler (07) 2242829

CONTACT OFFICER:
The Secretary (07) 2242828

OBJECTIVE

To collect data on wave heights and periods along the Queensland coastline for use in investigations into coastal processes or other specific projects.

METHODOLOGY

Data from a waverider buoy are recorded four times per day by a shore based receiver. Each record is analysed to produce routine and spectral wave parameters. Further analysis of the routine data can then be undertaken to give percentage exceedance persistence and return interval statistics.

GEOGRAPHIC REGIONS: R,Q

MAJOR DESCRIPTORS: Wave measurement/Data acquisition/Wave spectra/

[QLDBPA014]

37 SWIM II.

December 1985 - December 1988

ORGANIZATIONS:
Queensland Department of Geographic Information
PO Box 40
Woolloongabba, Qld 4102

University of Queensland, Queensland Centre for Surveying and Mapping Studies
St Lucia, Qld 4067

PROJECT LEADER:
Dr K. Lyons (07) 3773326

OBJECTIVES

To produce a Marine Information Sub System (MISS) in conjunction with Regional Land Information System.
MISS to contain information on reefs, navigation and water depths.

METHODOLOGY

To merge data from several sources (satellite imagery, hydrographic charts, topographic maps, and other available information) onto a common projection and datum. Final result will be on adjustable computerized tape and hard copies.

STATUS

A map of the Cairns/Green Island area has been produced.

Completed Project - This project will remain in the computerized Register for another 5 years but will not be included in future issues of the Compendium.

CO-ORDINATION WITH OTHER PROJECTS

Project was co-ordinated with and was part of the Cairns Regional Information System project by the Department of Mapping and Surveying.

LOCALITIES: Cairns; Green Island

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Data collections/Reefs/Oceanographic data/Navigation/Water depth/

[QDMS—007]

38** Theoretical studies of waves on a continental shelf.

ORGANIZATION:
University of New South Wales
PO Box 1
Kensington, NSW 2033

PROJECT LEADER:
Prof V.T. Buchwald (02) 6972961

OBJECTIVE
To undertake theoretical studies of waves of frequency of several minutes to several days occurring on the continental shelf, and in the Barrier Reef Lagoon.

METHODOLOGY
Various mathematical and numerical techniques are used to solve the barotropic equations of motion of the ocean in a rotating reference frame, with appropriate boundary conditions.

STATUS
Several papers on shelf waves, shelf resonance and edge waves have been published. Work on diffraction of shelf waves is well advanced.

GEOGRAPHIC REGIONS: R,Q,N

MAJOR DESCRIPTORS: Water waves/Continental shelves/Mathematical models/Numerical analysis/

[UNINSW010]

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39 Coastal circulation due to oceanic alongshore pressure gradients.**

ORGANIZATIONS:
University of New South Wales, School of Mathematics
PO Box 1
Kensington, NSW 2033

CSIRO, Division of Oceanography
PO Box 1538
Hobart, Tas 7001

PROJECT LEADERS:
Dr J.H. Middleton (02) 6973176
Dr J.A. Church (002) 206222

CONTACT OFFICER:
Dr J.H. Middleton

EXTERNAL SUPPORT:
MSTGS

OBJECTIVE
To measure the current field over the continental shelf generated by oceanic alongshore pressure gradients, and to compare observations with theory.

METHODOLOGY
Steric heights evaluated from CTD data, tide gauge data, current meter data and wind data are being used to separate the response of the oceanic forcing from that of the wind forcing.

STATUS
Field project completed. Data analyses ongoing.

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Shelf dynamics/Continental shelves/Pressure gradients/

[UNINSW051]

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40 Tidal flow across reefs.**

October 1984 -

ORGANIZATIONS:
University of New South Wales, School of Mathematics
PO Box 1
Kensington, NSW 2033

James Cook University of North Queensland, Department of Civil and Systems Engineering
Townsville, Qld 4811

PROJECT LEADERS:
Dr J.H. Middleton (02) 6973176
Dr L. Bode (077) 814214

CONTACT OFFICER:
Dr J.H. Middleton

EXTERNAL SUPPORT:
MSTGS - $45,594

OBJECTIVE
To measure tidal constants on the outer reef in the Mackay region, and to measure the variation of tidal amplitude and phase as it progresses from the ocean to the inner Lagoon. To evaluate and calibrate large scale numerical and analytical models of flow across and through reef structures.

METHODOLOGY

Current meters and tide gauges deployed in Hydrographers Passage in October 1984 have provided data and tidal analyses for each location and will provide constituent data. These data will be compared with predictions of existing numerical and analytical models.

CO-ORDINATION WITH OTHER PROJECTS

Hydrodynamic studies of water movements within the Great Barrier Reef Region (Dr. L. Bode and Professor K.P. Stark)

LOCALITY: Hydrographers Passage

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Tidal currents/Reefs/Oceanographic data/Mathematical models/

[UNINSW037]

41 Cyclonic waves at Heron Island and their influence upon coastal processes and marine park management.

January 1986 - December 1989

ORGANIZATIONS:

University of Queensland, Department of Civil Engineering
St Lucia, Qld 4067

Blain, Johnson Pty Ltd
348 Edward Street
Brisbane Qld 4000

PROJECT LEADERS:

Dr M.R. Gourlay (07) 3772543
Mr C. McMonagle

CONTACT OFFICER:

Dr M.R. Gourlay

EXPENDITURE:

$6,050 (all years)

EXTERNAL SUPPORT:

MSTGS

OBJECTIVES

To hindcast the wave conditions at the seaward edge of the reef platform during several historical cyclones which are known to have had significant effects upon either the beaches of Heron Island or its marine facilities.

To show the effectiveness of recently developed modelling procedures for cyclonic wave prediction in their application to predict the wave 'hydrograph' to a sufficient accuracy in a given situation.

METHODOLOGY

The cyclone wave prediction model developed at James Cook University will be utilised to hindcast wave conditions on the northern and southern sides of Heron Reef adjacent to Heron Island for several historical cyclones. The model has been modified to take account of the barometric gradient external to the cyclone.

STATUS

A gridded digital terrain model of the sea floor in the Capricornia Region has been prepared from a variety of map sources with differing scales and projections by the Australian Key Centre in Land Information Studies using the Centre's computer vision graphics system. The grid is stored on magnetic tape. Meteorological data obtained from synoptic charts prepared during various cyclones has been used in the model. There is good agreement between wave heights generated by the model and very limited wave rider buoy data taken during cyclone 'David', January 1976. Wave hind casts have been made for eight cyclones and further hind casts are being made of waves generated by barometric pressure gradients in the absence of cyclones. Interpretation of the predicted wave data and its effects is in progress.

LOCALITY: Heron Island

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Wave predicting/Storm surge prediction/Coastal morphology/Tidal models/

[UNIQLD091]

42 Mathematical simulation of the morphological dynamics of tidal inlets.

June 1984 -

ORGANIZATION:
University of Queensland, Department of Civil Engineering
St Lucia, Qld 4067

PROJECT LEADER:
Prof C.J. Apelt (07) 3773337

EXPENDITURE:
$25,000 (this year), $96,900 (all years)

MANPOWER:
1.10 (this year), 3.60 (all years)

EXTERNAL SUPPORT:
MSTGS - $70,349

OBJECTIVE
To develop a mathematical model which will take into account all of the known physical influences which affect the size and stability of tidal inlets and to test the validity of the model against the actual morphological dynamics of selected tidal inlets on the east coast of Australia. In this context, tidal inlets are intended to include estuaries and tidal lakes and lagoons.

METHODOLOGY
It is proposed to develop a numerical model which will include the following segments:-
1. Hydrodynamic model of tidal and flood flows in the inlet.
2. Hydrological model of the land catchment of the inlet to provide the stochastic flows as input to 1.
3. Fluvial sediment transport model to provide the stochastic supply of sediment to the inlet due to flood flows.
4. Littoral transport model to provide the stochastic supply of sediment to the inlet due to wave action.
5. Model of sediment transport in the inlet which uses the information from the other model segments to predict the response of the inlet to the combined effects of sediment inputs from fluvial and littoral processes and flushing of sediments by tidal and flood flows.

STATUS
All of the model segments have been completed and satisfactory modelling has been carried out with synthetic data. Satisfactory modelling of one Queensland inlet has been completed. A second inlet in Queensland and one in NSW have been modelled with very satisfactory results.

GEOGRAPHIC REGIONS: R,Q,N

MAJOR DESCRIPTORS: Tidal currents/Mathematical models/Hydrodynamics/Sediment transport/Tidal inlets/

[UNIQLD092]

43 Modelling the tides of the Coral Seaway.

October 1980 -

ORGANIZATION:
University of Queensland, Department of Civil Engineering
St Lucia, Qld 4067

PROJECT LEADER:
Prof C.J. Apelt (07) 3773337

EXPENDITURE:
$1,000 (this year), $23,000 (all years)

MANPOWER:
0.10 (this year), 1.80 (all years)

EXTERNAL SUPPORT:
AMSTAC-FAP - $13,319

OBJECTIVE
To develop a numerical model to simulate the ocean tides in the coral seaway between the east coast of Queensland and the outer fringe of the Great Barrier Reef, in the region between Gladstone and Bowen. In the central part of this region the tidal ranges are the largest for the whole of the Australian coastline, except for the north-west coast of Western Australia. The primary purpose in the numerical modelling is to improve the understanding of the mechanisms which give rise to such large tidal ranges.

METHODOLOGY
The tidal dynamics are described by the St Venant equations, representing long wave phenomena in two dimensions in plan. These equations are approximated by finite-difference expressions and are integrated numerically by an explicit "leap-frog" procedure.

STATUS
The numerical model has been completed. It has been established that the geography of the reef, of channels and their relationship to the coast result in significant amplification of the M2 tide. The diurnal

tidal constituent is not amplified significantly. The exact details of shape of coastline, etc. are not particularly important, rather their overall scale and proportions. The model has been refined by finer representation of reefs. Further studies will focus on details of tidal phenomena near Broad Sound.

CO-ORDINATION WITH OTHER PROJECTS

Liaison is maintained with analytical studies and field investigations of the same phenomena, being directed by Professor V.T. Buchwald of the University of New South Wales, Department of Applied Mathematics.

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Tidal currents/Tidal range/Mathematical models/Coral reefs/

[UNIQLD006]

44 Wave decay and transformation through the Great Barrier Reef.

January 1988 - December 1991

ORGANIZATIONS:

University of Queensland, Department of Civil Engineering
St Lucia, Qld 4067

Australian Defence Force Academy
Northcott Drive
Canberra, ACT 2600

Australian Institute of Marine Science
PMB No 3
Townsville M.C., Qld 4810

PROJECT LEADERS:

Dr M.R. Gourlay (07) 3772543
Dr I. Young
Dr E. Wolanski
Mr R.C. Nelson

CONTACT OFFICER:

Dr M.R. Gourlay

EXPENDITURE:

$93,500 (this year)

EXTERNAL SUPPORT:

MSTGS/ARC
GBRMPA

OBJECTIVES

To develop an understanding of the physical processes of wave breaking at the edge of coral reefs and their subsequent decay and transformation as broken waves as they propagate across the reef.
To measure wave driven circulation on a reef.
To develop and test numerical models for wave prediction in the Great Barrier Reef.
To set design criteria for structures on reef systems.
To study the influence of wave action on sand cay behaviour.
To examine data analysis techniques for the highly nonlinear waves which occur in reef regions.

METHODOLOGY

Collection of wave and current measurements on John Brewer Reef employing a total of 23 oceanographic instruments. Deployment of instruments for measuring wave and current conditions across a reef matrix. Measurement of wave decay and transformation on a reef with a coral cay (Wheeler Reef and North Reef). Measurement of wave transformation, set-up and wave generated currents in coastal processes wave basin at University of Queensland. Measurement of wave breaking and propogation in flume at ADFA. Modification of existing Sobey and Young (1986) wave prediction model to take account of dissipation across a reef. Development of simple parametric model to provide sea- state predictions within the Great Barrier Reef.

STATUS

First field experiment on waves propagating across a reef was carried out at John Brewer Reef in August/September this year. A vast amount of data has been obtained and this is now being analysed. Wave rider buoys remain in place offshore and in the lagoon at John Brewer Reef to record any cyclonic or severe wave conditions during summer 1988/89. Planning is in progress for second experiment measuring wave propagation through the reef system offshore from Townsville during July/August 1989.

LOCALITIES: John Brewer Reef; North Reef

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Wave dissipation/Coral reefs/Wave effects/Breaking waves/Mathematical models/

[UNIQLD108]

45 Wave set-up on coral reefs - comparison of two and three dimensional models.

January 1985 - December 1989

ORGANIZATION:
University of Queensland, Department of Civil Engineering
St Lucia, Qld 4067

PROJECT LEADER:
Dr M.R. Gourlay (07) 3772543

EXPENDITURE:
$16,000 (this year), $60,000 (all years)

MANPOWER:
1.80 (this year)

EXTERNAL SUPPORT:
MSTGS

OBJECTIVE

To determine the relative magnitude of the wave set-up on a reef platform in two and three dimensional conditions. Information relating to the transformation and attenuation of waves as they travel over reef platforms is relevant to the design of navigation lights in the Great Barrier Reef and other regions of northern Australia, as well as design of structures for oil and gas extraction on the North West shelf.

METHODOLOGY

A physical model of an idealised reef platform is being tested in the University of Queensland's 32 m x 21/18.5 m coastal processes wave basin.
Testing of the two dimensional situation is to be carried out involving: (a) passage of waves across a reef platform into open ocean, (b) passage of waves across a reef platform into a lagoon, (c) passage of waves across a reef platform in front of a beach.

STATUS

A two dimensional reef platform model has been constructed in the wave basin and tests with waves passing over the reef platform into a confined lagoon have been completed. These conditions are similar to those occurring on a fringing reef. Considerable delays have been experienced with instrumentation problems, equipment breakdowns and adverse weather problems. The model has been modified to represent a reef platform in an open ocean situation. Preliminary experiments have been carried out and instrumentation set up to measure the substantial water flows generated across the reef. Full scale testing will recommence in early 1989. The results of this project will be used in interpreting field data acquired at John Brewer Reef (Project (UNIQLD108).

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Wave setup/Coral reefs/Mathematical models/

[UNIQLD089]

46* Circulation of suspended solids.

June 1986 - June 1989

ORGANIZATION:
University of Queensland, Department of Geographical Sciences
St Lucia, Qld 4068

PROJECT LEADER:
Mr P. Hoffenberg (07) 3773226

EXPENDITURE:
$4,000 (this year), $12,000 (all years)

MANPOWER:
2.00 (this year), 3.00 (all years)

EXTERNAL SUPPORT:
GBRMPA - $500
DPI Fisheries (boat, sampling equipment)
Queensland Department of Harbours and Marine (Tide gauge/current meters)

OBJECTIVE

To combine field data and Landsat imagery to observe the circulation of suspended solids in Repulse Bay and the Whitsunday Islands, and their interactions with selected fringing reefs.

METHODOLOGY

Calibration of Landsat MSS images to determine suspended sediment concentrations both within the bay and in the Whitsunday passage. Synchronous with satellite overpasses, gravimetric and Secchi data will be obtained.
The satellite images will be processed and used to model surface and near surface flow. The model will also be supported by current meter, wind and tide data.

STATUS

Fieldwork was undertaken (May to July 1987) which was sufficient to calibrate some images. Two Landsat scenes of the area have been fully processed.
Further fieldwork is anticipated for the same period in 1988, as well as the acquisition of several more satellite tapes.

LOCALITIES: Repulse Bay; Whitsunday Islands

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Suspended particulate matter/Circulation/Coastal waters/Satellite sensing/ Fringing reefs/

[UNIQLD104]

47 Heat storage and surface fluxes of the Coral Sea.

February 1984 - June 1988

ORGANIZATIONS:

University of Tasmania, Department of Geography
GPO Box 252C
Hobart, Tas 7001

CSIRO, Division of Oceanography
GPO Box 1538
Hobart, Tas 7001

PROJECT LEADERS:

Mr M. Nunez (002) 202466
Mr G. Meyers (002) 206222

CONTACT OFFICER:

Mr K. Michael (002) 202484

EXPENDITURE:

$5,000 (this year), $15,000 (all years)

MANPOWER:

1.50 (this year), 6.00 (all years)

OBJECTIVE

To develop techniques for estimating ocean/atmosphere heat fluxes using satellite data.

METHODOLOGY

1. Estimate ocean/atmosphere heat fluxes using an instrumented platform in the Coral sea.
2. Simultaneously collect GMS and NOAA satellite data for the region.
3. Develop the techniques for estimating daily ocean/ atmosphere heat fluxes using 1 and 2.

STATUS

All experimental and satellite data has been collected and the analysis has been completed.

Completed Project - This project will remain in the computerized Register for another 5 years but will not be included in future issues of the Compendium.

CO-ORDINATION WITH OTHER PROJECTS

CSIRO - XBT Ship of Opportunity program.

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Heat storage/Heat transfer/Ocean circulation/Air-water exchanges/Satellites/

[UNITAS010]

48 Numerical modelling of coral reef hydrodynamics.

March 1986 -

ORGANIZATIONS:

Victorian Institute of Marine Sciences
14 Parliament Place
Melbourne, Vic 3002

Australian Institute of Marine Science
PMB No 3
Townsville M.C., Qld 4810

PROJECT LEADERS:

Dr K.P. Black (03) 6511714
Dr J.C. Andrews (077) 789211

CONTACT OFFICER:

Dr K.P. Black

EXTERNAL SUPPORT:

COTSAC - $21,500 (Research Officer provided in collaboration with AIMS.)

OBJECTIVE

To identify circulation patterns around schematized and actual reefs, using a range of reef morphologies, to support assessment of dispersal and settlement capabilities of crown-of-thorns starfish larvae.

METHODOLOGY

Selected reef types, classified by their bathymetry, plan-shape and exposure to tidal currents, winds and waves, are being modelled to determine probabilities of local retention and advection of larvae to or from reefs. Results from schematized reefs will provide an overview of the hydrodynamic phenomena, and will be supplemented and validated by simulations of real reefs.

STATUS

Most modelling is completed and unpublished work is being written up.

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Coral reefs/Water circulation/Hydrodynamics/Larvae/Recruitment/Crown of thorns starfish/

[VIMS—017]

See also:

60 Nutrient dynamics on coral cays.

63 Diagenetic studies of organic compounds in recent and contemporary sediments.

74* Marine sediment studies, north Queensland shelf (MASSNQ).

83** Pelagic foraminifera in sediments of the continental shelf of eastern Australia.

170 COASTAL DYNAMICS: Dynamics of estuarine and coastal water and fluid mud dynamics.

211 MICRO- SCALE REEF WATER DYNAMICS: Tidal jets and Halimeda banks.

223 STRUCTURE OF MARINE SYSTEMS: A nitrogen budget for the north east Queensland shelf.

49 Oxidation-reduction photochemistry in marine systems.

May 1986 - December 1988

ORGANIZATION:
Australian Nuclear Science and Technology Organisation
Environmental Science Division
Private Mail Bag 1
Menai, NSW 2234

PROJECT LEADER:
Dr T.D. Waite (02) 5433896

EXPENDITURE:
$36,275 (this year)

MANPOWER:
1.50 (this year)

OBJECTIVES

To elucidate the role of light in inducing changes in chemical speciation in selected Australian estuarine and coastal seawaters and to examine the significance of such changes to (a) the removal of elements from the water column, and (b) trace metal uptake by phytoplankton.
A particular objective is to investigate the reaction pathways of photochemically produced hydrogen peroxide in seawaters.

METHODOLOGY

Hydrogen peroxide concentrations are being measured in field and laboratory studies using a sensitive fluorescence quenching technique and trace metal concentrations monitored using filtration/AAS methods. Radiotracer methods are being used where possible in laboratory studies.

STATUS

Extensive field work in Port Hacking, NSW has been performed and a collaborative field trip with AIMS scientists undertaken on the Great Barrier Reef. Studies off the coast of Venezuela with US marine scientists from the Woods Hole Oceanographic Institution complete.

Completed Project - This project will remain in the computerized Register for another 5 years but will not be included in future issues of the Compendium.

CO-ORDINATION WITH OTHER PROJECTS

Support of Australian Institute of Marine Science in undertaking field studies on the Great Barrier Reef. Additional support through the US/Australian Bilateral Science Agreement has enabled collaborative field work with US marine scientists in waters off the coast of Venezuela.

LOCALITY: Port Hacking
GEOGRAPHIC REGIONS: N,R
SHIP TIME REQUIREMENTS: 30 days
MAJOR DESCRIPTORS: Photochemistry/Chemical speciation/Coastal waters/Estuaries/Hydrogen compounds/Redox reactions/

[AAEC—009]

50 Nitrogen and phosphorus budgets for Great Barrier Reef shelf waters.

March 1989 -

ORGANIZATIONS:
Great Barrier Reef Marine Park Authority
PO Box 1379
Townsville, Qld 4810
Australian Institute of Marine Science
PMB No. 3
Townsville MC, Qld 4810

PROJECT LEADERS:
Ms C. Baldwin (077) 818811
Dr M. Furnas (077) 789211

CONTACT OFFICER:
Ms C. Baldwin

EXPENDITURE:
$18,000 (this year), $121,879 (all years)

OBJECTIVES

To prepare quantitative water column nitrogen (N) and phosphorus (P) budgets for two shelf-scale study zones, one in the central Great Barrier Reef between Palm Passage and Tully and the other, subject to a greater frequency of human visitation and usage, in the northern Great Barrier Reef between Green Island and Low Isles. Specific goals are:
1. quantifying N and P pools, sources and sinks for shelf waters between the coast and shelfbreak;
2. defining and measuring N and P fluxes into and out of water column nutrient pools and their variability in space and time;
3. estimating the importance of exogenous or anthropogenic nutrient inputs in shelf nutrient cycles; and
4. quantifying the role of natural events such as cyclones and floods in shelf nutrient dynamics.

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Shelf seas/Water column/Nitrogen/Phosphorus/Nutrients (mineral)/Nutrient cycles/

[GBRMPA197]

51* Novel compounds from marine organisms.

February 1984 -

ORGANIZATION:
Griffith University, School of Science
Nathan, Qld 4111

PROJECT LEADER:
Dr R.J. Quinn (07) 2757567

EXPENDITURE:
$15,580 (this year), $27,043 (all years)

MANPOWER:
1.00 (this year), 3.00 (all years)

EXTERNAL SUPPORT:
ARGS - $57,443 (1985-88)

OBJECTIVE

To examine marine organisms for novel constituents and to carry out isolation, purification and structure elucidation of the novel organic constituents. This would provide new structural types, which are unlikely to be obtained by any other means, for evaluation for their biological significance. Many therapeutically useful compounds are of natural origin and animals and plants are sources of a vast diversity of chemical products themselves biologically active with potential use in biological control and therapeutics. These studies would provide secure chemical knowledge necessary for further studies on understanding interactions between marine organisms.

METHODOLOGY

Novel constituents are identified by chromatographic and spectroscopic examination. Pure compounds are obtained by chromatographic techniques and structural elucidation undertaken by a combination of spectroscopic and chemical techniques. Particular emphasis is placed on 2D-NMR as a tool for solving structures.

STATUS

Novel brominated acetylenic acids from the sponge *Xestospongia testudinaria* are being investigated. Several new sesterterpenes have been isolated from another sponge.

GEOGRAPHIC REGIONS: R,Q

MAJOR DESCRIPTORS: Organic compounds/Marine organisms/Biological properties/Chromatographic techniques/Spectroscopic techniques/

TAXONOMIC TERMS: Xestospongia testudinaria

[GRIFFI012]

52* Marine chemical ecology: the role of small organic molecules in intra- and inter-specific interactions.

January 1985 - December 1988

ORGANIZATIONS:
James Cook University of North Queensland,
Department of Chemistry and Biochemistry
Townsville, Qld 4811

Australian Institute of Marine Science
PMB No. 3
MSO Townsville, Qld 4810

PROJECT LEADERS:
Dr J.C. Coll (077) 814533
Dr P.W. Sammarco (077) 789292

CONTACT OFFICER:
Dr J.C. Coll

EXPENDITURE:
$21,000 (this year), $75,000 (all years)

MANPOWER:
2.50 (this year), 7.50 (all years)

EXTERNAL SUPPORT:
MSTGS - $88,000 (1985-1988)

OBJECTIVES

1. To determine the role of small organic molecules in interspecific interactions.
2. To understand the success of soft corals in tropical waters.

METHODOLOGY

Laboratory and field studies on the chemical composition and ecology of soft corals in the Great Barrier Reef region.
The chemical composition of soft corals is determined by classical, natural products, chemistry procedures including high field NMR spectroscopy and X-ray crystallography. The ecological experiments include observation of natural situations and relocation of corals from inshore to outer shelf reefs.

STATUS

Data is available in publications and graduate theses through the contact officer. A large collection of alcyonacean soft corals are held in the Chemistry Department.

GEOGRAPHIC REGION: R

SHIP TIME REQUIREMENTS: 30 days

MAJOR DESCRIPTORS: Coral/Ecology/Chemical composition/Interspecific relationships/ Intraspecific relationships/

[JAMESC105]

53* **The isolation of novel compounds from marine invertebrates.**

January 1978 - December 1989

ORGANIZATION:

James Cook University of North Queensland,
Department of Chemistry and Biochemistry
Townsville, Qld 4811

PROJECT LEADER:

Dr J.C. Coll (077) 814533

EXPENDITURE:

$33,800 (this year)

MANPOWER:

1.50 (this year)

EXTERNAL SUPPORT:

ARGS - $309,880 (1981-1988)

OBJECTIVES

1. Isolation and structural elucidation of novel marine natural products.
2. Investigation of the biosynthetic pathways used in the elaboration of selected natural products, and the role of symbionts in this.
3. Assessment of possible medicinally useful compounds.

METHODOLOGY

Laboratory isolation of compounds from marine organisms, using routine natural products chemistry techniques.

STATUS

Data is available in publications and graduate theses through the contact officer. A large collection of alcyonacean soft corals are held in the Chemistry Department.

CO-ORDINATION WITH OTHER PROJECTS

Collaborative links with the University of Western Australia, Monash University and University of Canterbury for X-ray structure solution.

GEOGRAPHIC REGION: R

SHIP TIME REQUIREMENTS: 6 days

MAJOR DESCRIPTORS: Biochemistry/Biological production/Chemical compounds/Marine organisms/ Symbiosis/

[JAMESC044]

54** **Chemistry of biologically significant compounds from marine organisms.**

May 1985 - May 1990

ORGANIZATIONS:

James Cook University of North Queensland, Sir George Fisher Centre for Tropical Marine Studies
Townsville, Qld 4811

Seapharm Incorporated
5600 Old Dixie Highway
Fort Pierce
Florida, USA 33450

PROJECT LEADERS:
Dr J.T. Baker (077) 789221 (AIMS)
Dr P.T. Murphy (077) 814910 (JCU)

CONTACT OFFICER:
Dr P.T. Murphy

EXPENDITURE:
$70,000 (this year), $140,000 (all years)

MANPOWER:
1.50 (this year), 2.50 (all years)

OBJECTIVES

1. To supply extracts from marine organisms for screening by SeaPharm for anti-tumour, anti-viral, anti-microbial and immunomodulatory activities.
2. Isolation and structural elucidation of compounds responsible for bioactivities detected in these assays.

METHODOLOGY

Collection mainly by SCUBA.
Extraction for bioassay using wide polarity mixed solvents.
Assays by standard techniques in each activity.
Isolation by chromatographic techniques.
Structural elucidation by MS, NMR, IR, UV, X-ray crystallography, etc.

STATUS

A number of biologically active extracts and compounds have been identified.
Form: Screening data has been entered into database.
Availability: This is proprietary information subject to confidentiality agreement.
Access: Limited, through project leader.

GEOGRAPHIC REGION: R
SHIP TIME REQUIREMENTS: 10 days
MAJOR DESCRIPTORS: Biotechnology/Organic compounds/Marine organisms/

[JAMESC100]

55 Estuarine and seawater chemistry.

ORGANIZATION:

University of Melbourne, Marine Chemistry Laboratory
School of Chemistry
Parkville, Vic 3052

PROJECT LEADER:
Dr J.D. Smith (03) 3447093

MANPOWER:
0.50 (this year)

OBJECTIVE

Understanding of factors controlling the composition of seawater and estuarine waters, including the micronutrients (P, Si), redox sensitive elements (I, As, Fe, Cu), and radionuclides (U, Po). Modelling of the chemical effects of mixing river and seawater.

METHODOLOGY

Field and laboratory measurements of the chemical properties of seawater, river waters, and intermediate mixtures. Laboratory modelling of the chemical behaviour of estuaries.

STATUS

Methods established, some results published.

GEOGRAPHIC REGIONS: A,B,R
MAJOR DESCRIPTORS: Chemical oceanography/Estuarine chemistry/Modelling/

[UNIMEL063]

56 Anthropogenic inputs to the inner reef off Cairns and Green Island.

December 1987 -

ORGANIZATION:

University of Melbourne, School of Chemistry
Parkville, Vic 3052

PROJECT LEADER:
Dr R.B. Johns (03) 3446490

MANPOWER:
0.25 (this year)

OBJECTIVES

To determine the nature of anthropogenic influences on inner reef waters in a transect from Cairns to Arlington Reef, and around Green Island.
To assess their importance (if found to be present) by a study of the stability of the biogeomarkers to diagenetic change.

METHODOLOGY

Methodology centres on the isolation from sediments and particulates of geo and biolipids associated with anthropogenic inputs as well as pesticide residues. Structural identifications are carried through.

LOCALITIES: Green Island; Cairns; Arlington Reef

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Anthropogenic factors/Coral reefs/Pollution effects/Environmental conditions/

[UNIMEL071]

57 Aromatic hydrocarbons and oil pollution in the marine environment.

January 1973 -

ORGANIZATION:
University of Melbourne, School of Chemistry
Parkville, Vic 3052

PROJECT LEADER:
Dr J.D. Smith (03) 3447093

MANPOWER:
0.50 (this year), 7.00 (all years)

EXTERNAL SUPPORT:
MSTGS - $12,000 (1986)

OBJECTIVE

To determine the distribution of aromatic hydrocarbons, including polycyclic aromatic hydrocarbons in the marine environment. To understand the sources of these compounds, their pathways into waters, sediments and organisms, and their degradation.

METHODOLOGY

Development and application of analytical procedures, using solvent extraction, HPLC and fluorescence spectroscopy and GC/MS

STATUS

Methods well established, results for water, organisms and sediments published. Great Barrier Reef and Port Phillip Bay reported. Major estuaries currently being studied.

GEOGRAPHIC REGIONS: B,R,T,H

MAJOR DESCRIPTORS: Aromatic hydrocarbons/Biogeochemical cycle/Bioaccumulation/Sediments/Baseline studies/

[UNIMEL021]

58 Multielement analysis of marine sediments and tissues of marine organisms.

ORGANIZATION:
University of Melbourne, School of Chemistry
Marine Chemistry Laboratory
Parkville, Vic 3052

PROJECT LEADER:
Dr V. McRae (03) 3451844

MANPOWER:
1.00 (this year)

OBJECTIVE

Development of analytical methods for the analysis of marine sediments and the tissues of marine organisms using small amounts of sample material. Application to the use of sediments and marine organisms as indicators for assessment of marine pollution. Rapid methods for determination of all elements from sodium to uranium.

METHODOLOGY

Use of a variety of chemical and instrumental methods for calibration of rapid energy dispersive x-ray fluoroscence analysis procedures.

GEOGRAPHIC REGIONS: A,B,R

MAJOR DESCRIPTORS: Sediment analysis/Tissues/Indicator species/Pollution detection/

[UNIMEL064]

59 Radionuclides in the study of marine processes.

ORGANIZATION:
University of Melbourne, School of Chemistry
Marine Chemistry Laboratory
Parkville, Vic 3052

PROJECT LEADER:
Dr J.D. Smith (03) 3447093

MANPOWER:
0.50 (this year)

EXTERNAL SUPPORT:
MSTGS

OBJECTIVE
Use of radionuclides in the natural uranium-decay series to elucidate mechanisms and rates of sedimentation, coral growth, and ferromanganese nodule growth. Understanding of the influence of benthic organisms on radionuclide distributions. Measure and model the distribution of naturally occuring U-238 decay series radionuclides in marine and lake sediments. Establish the interactions of the radionuclides with benthic organisms, the effects on sediment dating, and transfer of radionuclides into food chains.

METHODOLOGY
α- and γ- spectrometry, liquid scintillation counting. Pb-210, U/Th, U/Pa and U/Ra dating.

STATUS
Refined techniques for uranium series dating. Methods established for U, Th, Pa, Ra, Po and Pb radio-isotopes.

GEOGRAPHIC REGIONS: A,B,R

MAJOR DESCRIPTORS: Sediment analysis/Ferromanganese nodules/Coral/Benthos/Radionuclide kinetics/

[UNIMEL061]

60 Nutrient dynamics on coral cays.

January 1987 - December 1989

ORGANIZATIONS:
University of New England, Department of Botany
Armidale, NSW 2351
University of New England, Department of Zoology

PROJECT LEADERS:
Dr J.L. Charley (067) 732340
Assoc Prof H. Heatwole (067) 732468

CONTACT OFFICER:
Dr J.L. Charley

EXPENDITURE:
$36,269 (this year)

MANPOWER:
1.00 (this year)

EXTERNAL SUPPORT:
ARC - $43,298

OBJECTIVE
An analysis of nutrient input to coral cays by way of guano deposition, and the significance of nutrient leakage from cays to the surrounding reef platforms as a result of washover, leaching and volatilization. The study is also concerned with factors affecting the distributions of the predominant plant species, particularly salinity, water stress and nutrients.

METHODOLOGY
The study is examining the nitrogen and phosphorus status of seawater over and around cayed or non-cayed reef platform pairs. Other components are tidal movements under cays, as determined by bore logging; soil nutrient distributions and mineralization of nitrogen; ammonia volatilization; and plant distribution analysis by repetitive photography.

STATUS
A set of cays in the Swain Reefs was chosen. Two vegetated cays were sampled to establish soil nutrient status and depth distributions of guano-derived N and P. A number of bores were sunk to allow water sampling in transects along and across the cays. Additional samples of beach drainage, lagoon and channel waters were collected. Soil and water samples are currently being analysed.

LOCALITY: Swain Reefs

GEOGRAPHIC REGION: R

SHIP TIME REQUIREMENTS: 20 days

MAJOR DESCRIPTORS: Cays/Coral reefs/Guano/Nutrient cycles/Water analysis/Plant populations/

[UNIARM008]

61** Toxicology of marine animals.

ORGANIZATION:
University of Queensland, Department of Zoology
St Lucia, Qld 4067

PROJECT LEADER:
Assoc Prof R. Endean (07) 3772482

CONTACT OFFICER:
Dr A.M. Cameron (07) 3772506

EXPENDITURE:
$25,827 (this year), $47,613 (all years)

MANPOWER:
2.00 (this year), 4.00 (all years)

EXTERNAL SUPPORT:
ARGS
FIRTA

OBJECTIVE
Screening for and pharmacological testing of bioactive compounds in marine animals.

METHODOLOGY
Standard extraction, bioassay, pharmacological, culture and chemical preparative techniques are used.

STATUS
Discovery of several bioactive compounds with potential for new antibiotics, new cardioactive and other therapeutic drugs.

GEOGRAPHIC REGIONS: R,Q

MAJOR DESCRIPTORS: Bioassays/Marine organisms/Pharmacology/Toxicity/Toxicology/

[UNIQLD063]

62 Fluxes of inorganic nitrogen through benthic sediments on a coral reef.

January 1984 - December 1988

ORGANIZATION:
University of Sydney, School of Biological Sciences
Building A.12
Sydney, NSW 2006

PROJECT LEADERS:
Mr R.W. Johnstone (02) 6924241
Assoc Prof A.W.D. Larkum (02) 6922069

CONTACT OFFICER:
Mr R.W. Johnstone

EXPENDITURE:
$11,000 (this year), $32,000 (all years)

MANPOWER:
1.00 (this year), 4.00 (all years)

EXTERNAL SUPPORT:
MSTGS - $14,000

OBJECTIVES
To examine the exchange of inorganic nitrogen between sediments and the overlying water column.
To investigate the major metabolic processes involved in such exchanges and the flow of inorganic nitrogen through coral reef sediments generally.

METHODOLOGY
Sediment/water column fluxes are measured using enclosure experiments.
Interstitial water is assayed for NO_3,NO_2 and NH_4 at different depths in sediments to determine concentration gradients of each.
Ammonification, denitrification and nitrification rates are determined for the sediments using a combination of methods including N^{15} dilution techniques, acetylene inhibitor techniques and N - serv inhibitor method.
Also, all sediments are assayed for grain size distribution and O_2, pH and Eh profiles using microelectrodes.

STATUS

Two papers are presently in press:
1. Fluxes of free ammonium between sediments and the water column in a coral reef lagoon.
2. The distribution of carbon and nitrogen in sediments on a coral reef lagoon. PhD thesis will be presented in 1989.

Completed Project - This project will remain in the computerized Register for another 5 years but will not be included in future issues of the Compendium.

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Nitrogen/Biogeochemical cycle/Coral reefs/Benthic environment/ Sediment-water exchanges/

[UNISYD106]

See also:

176 COASTAL TROPHODYNAMICS: Carbon, nitrogen and phosphorus flows within mangroves.

308 Hydrocarbons in sediments and seawater.

63 Diagenetic studies of organic compounds in recent and contemporary sediments.

January 1983 -

ORGANIZATION:
University of Melbourne, School of Chemistry
Parkville, Vic. 3052

PROJECT LEADER:
Dr R.B. Johns (03) 3446490

OBJECTIVE

To reconstruct input sources from analyses of organic molecules present in the particulates in the water column and in the underlying sediment; and to assess the nature of the microbial biomass in the upper layers of the benthos. To achieve this, secondary aims are to raise a database on the taxonomy of marine organisms, and to develop an understanding of the chemical and biodegradative pathways of relevant organic substrates in oxidising and reducing marine environments.

METHODOLOGY

Methodology in these studies centres primarily in the isolation and purification of geo and bio-lipids which is achieved by the adaptation of conventional techniques of lipid chemistry. Structure determinations are carried out. Non-contaminatory methods of handling materials are necessary.

STATUS

Terrestrial input to the lake sediments has been identified by the use of biological markers. Organic geochemical understandings of the diagenesis of terrestrial inputs are developing. The study areas include Corner Inlet and the Gippsland Lakes.

LOCALITIES: Corner Inlet; Gippsland Lakes

GEOGRAPHIC REGIONS: V,R

MAJOR DESCRIPTORS: Palaeoclimatology/Palaeoceanography/Lipids/Chemotaxonomy/Sediments/

[UNIMEL035]

See also:

19 FORCINGS OF MARINE SYSTEMS: Weather stations on the Great Barrier Reef.

187 CORAL CHRONOLOGIES/PALEOENVIRONMENTS: Paleoclimatic studies using fluorescent band paleohydrology proxy records.

192 CORAL GROWTH, DENSITY AND CLIMATIC MODELLING: Density variation and climate.

64 Bioerosion of coral substrates, and mechanisms by which animals bore.

January 1980 -

ORGANIZATION:

Australian Museum
Invertebrate Division
6-8 College Street
Sydney, NSW 2000

PROJECT LEADER:

Dr P.A. Hutchings (02) 3398243

EXPENDITURE:

$25,000 (this year), $75,000 (all years)

MANPOWER:

1.50 (this year), 7.50 (all years)

EXTERNAL SUPPORT:

MSTGS - $87,000

OBJECTIVES

To determine the major agents of coral bioerosion.
To determine rates of bioerosion in varying coral reef environments.
To identify the changes in the boring communities over time.
To determine mechanisms by which animals bore.

METHODOLOGY

To expose unbored coral blocks for varying periods of time and at various localities and to measure the rates of bioerosion and identify the causal agents.

STATUS

Variations within and between sites described in draft manuscript, to be submitted 1989 to Coral Reefs..

CO-ORDINATION WITH OTHER PROJECTS

A thesis was submitted in December 1988 by a PhD student, funded by GBRMPA to study bioerosion in the Capricornia section of GBR.

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Coral reefs/Boring organisms/Bioerosion/

[AUSMUS004]

65 Mixing of radiocarbon across the Great Barrier Reef lagoon.

June 1985 - December 1989

ORGANIZATIONS:

Australian National University, Research School of Earth Sciences
GPO Box 4
Canberra, ACT 2601

Australian Institute of Marine Science
PMB No. 3
Townsville MC, Qld 4810

PROJECT LEADERS:

Dr. A.R. Chivas (062) 493247
Dr. P. Isdale (077) 789235
Mr. C.J. Radnell (062) 494229

CONTACT OFFICER:

Dr. A.R. Chivas

OBJECTIVE

Measure modern and past (last 100 years) mixing and upwelling rates of C^{14} and C^{13} across the continental shelf and lagoon of the Great Barrier Reef. Determine terrestrial and atmospheric inputs of C^{13} and C^{14}.

METHODOLOGY

Use cores of large massive corals collected in a transverse across the Great Barrier Reef lagoon near Townsville. Cores are from Pandora Reef and Brittomart Reef and possibly the Flinders Reefs. Determine annual banding in corals by fluorescence and x-radiography. Separate individual annual layers and measure C^{14} and C^{13} contents.

STATUS

C^{14} measurements completed for yearly intervals from 1945 to 1983 for coral cores from Pandora Reef and Brittomart Reefs. Some C^{14} measurements completed for the Brittomart Reef from 1888 to 1900. Raw and reduced data available from A.R. Chivas, C.J. Radnell and kept on file in ANU Radiocarbon Laboratory.

LOCALITY: Brittomart Reef

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Carbon isotopes/Upwelling/Coral reefs/Core analysis/Lagoons/

[ANU—019]

66 **Basin development and evolution of the continental margin of northeast Australia.**

November 1985 - March 1988

ORGANIZATION:
Bureau of Mineral Resources, Geology and Geophysics
PO Box 378
Canberra City, ACT 2601

PROJECT LEADERS:
Dr P.J. Davies (062) 499345
Dr P. Symonds

CONTACT OFFICER:
Dr P.J. Davies

EXPENDITURE:
$3,500,000 (all years)

MANPOWER:
15.00 (all years)

OBJECTIVES

1. To establish the regional stratigraphy and structural framework.
2. To establish the effects of basinal and syn-depositional tectonics on the development of the regional framework.
3. To establish the relations between tectonics, sediment style and sea level change.
4. To define lithofacies, age and depositional environment of the Mesozoic and Cainozoic sections.
5. To examine slope and basin floor depositional processes adjacent to a large epicontinental reef system.

METHODOLOGY

To use the R.V. *Rig Seismic* to deploy multichannel seismic, sidescan sonar and sampling equipment.

STATUS

Two cruises have been completed.

Completed Project - This project will remain in the computerized Register for another 5 years but will not be included in future issues of the Compendium.

GEOGRAPHIC REGIONS: R,Z

MAJOR DESCRIPTORS: Geological history/Geological structures/Stratigraphy/Tectonics/Lithofacies/

[BMR—031]

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67 **Environmental, phylogenetic and biostratigraphic studies.**

July 1984 -

ORGANIZATION:
Bureau of Mineral Resources, Geology and Geophysics
Division of Marine Geoscience and Petroleum Geology,
G.P.O. Box 378,
Canberra, A.C.T. 2601

PROJECT LEADERS:
Dr G.C.H. Chaproniere (062) 499538
Mr S. Shafik (062) 499537

CONTACT OFFICER:
Dr G.C.H. Chaproniere

OBJECTIVE

To determine the biostratigraphic and environmental significance of microfaunas and microfloras from samples collected during the marine geoscience program of the Bureau of Mineral Resources, as a contribution to the study of the geological history of the Australian margins and nearby areas. Study phylogenetic trends as an aid to correlation.

METHODOLOGY

Standard collection, production and observational techniques applied to marine samples.

GEOGRAPHIC REGIONS: B,E,R,S,Z

MAJOR DESCRIPTORS: Geological history/Biostratigraphy/Phylogeny/Environmental effects/Stratigraphic correlation/

[BMR—027]

68** **Factors affecting growth and maintenance of reefs in the central Great Barrier Reef.**

March 1980 -

ORGANIZATION:
Bureau of Mineral Resources, Geology and Geophysics
P.O. Box 378
Canberra City, A.C.T. 2601

PROJECT LEADER:
Dr P.J. Davies (062) 499217

EXTERNAL SUPPORT:
ADAB - $50,000

OBJECTIVE
To identify and describe the factors affecting the growth of reefs, their morphological variations, and the stability of the reef framework, both in recent times and earlier in the stratigraphic record.

METHODOLOGY
Shallow drilling through the existing reef framework and through reef-derived sediments. Quantitative measurement of the movement of water and sediment over and through the reef. Surface and sub-surface mapping of lithological variations on and around the reefs.

STATUS
Many papers have already been published. Data is still being analyzed in preparation for a major publication, probably in 1986. A book on the Evolution of the Great Barrier Reef will be published in 1988.

CO-ORDINATION WITH OTHER PROJECTS
With Prof. D. Hopley's programme at James Cook University.

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Coral reefs/Reef formation/Stability/

[BMR—010]

69 Structure, stratigraphy, evolution and regional framework of the Marion Plateau, Townsville Trough and Queensland Plateau.

ORGANIZATION:
Bureau of Mineral Resources, Geology and Geophysics
PO Box 378
Canberra, ACT 2601

PROJECT LEADERS:
Dr P.J. Davies (062) 499345
Mr P.A. Symonds (062) 499379

CONTACT OFFICER:
Dr P.J. Davies

OBJECTIVES
Accurately define the structural style and seismic stratigraphic framework of the Townsville Trough. Map the extent of major structural traps and depocentres in the trough.
Define the regional geological framework of the Marion Plateau with a view to assessing its resource potential.
Define the structural and sedimentological factors effecting margin evolution, and attempt to gain an insight into the relative subsidence histories of the Marion and Queensland Plateaus.
Conduct ODP site surveys to support ODP drilling proposal for northeast Australia.

METHODOLOGY
Acquisition, processing and analysis of seismic, gravity, magnetics, core and dredge samples and heatflow data.
Model the rift/reef/marginal plateau association for use in interpretation of other Australian basins.

STATUS
Two *Rig Seismic* cruises were conducted during the latter half of 1987.
Cruise 1: September 1987. High resolution seismics over Marion Plateau and for ODP site surveys; dredging and coring transects across the Townsville Trough and Marion Plateau.
Cruise 2: November 1987. Multichannel seismics using the two airgun arrays over the Townsville Trough and Marion Plateau; coring for ODP site surveys.
Processing of non-seismic data completed; processing of water gun seismic data virtually complete; processing of dual-array air gun data over Townsville Trough will be finished by late 1989. ODP drilling leg off north-east Australia scheduled for mid-1990. ODP site survey panel has approved site survey data and Pollution Prevention and Safety Panel has carried out a preliminary review of the data.

LOCALITIES: Marion Plateau; Townsville Trough; Queensland Plateau

GEOGRAPHIC REGIONS: R,Z

MAJOR DESCRIPTORS: Geological structures/Geological history/Oil and gas exploration/ Stratigraphy/

[BMR—040]

70 Coastal processes forming and maintaining coral cays of the Great Barrier Reef and their implications for Marine Park Management.

August 1983 -

ORGANIZATIONS:

Great Barrier Reef Marine Park Authority
PO Box 1379
Townsville, Qld 4810

University of Queensland, Department of Civil Engineering
St Lucia, Qld 4067

PROJECT LEADERS:

Ms C. Baldwin (077) 818811
Dr M.R. Gourlay (077) 3771111

CONTACT OFFICER:

Ms C. Baldwin

EXPENDITURE:

$4,000 (all years)

OBJECTIVE

To collect and collate relevant available information on physical and geomorphological processes forming and maintaining cays.

METHODOLOGY

Overview of available literature, assessment of its relevance to the Great Barrier Reef Region, review of current developments on Great Barrier Reef cays and assessment of future research needed.

STATUS

Final report in preparation.

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Coral reefs/Cays/Geomorphology/Coastal morphology/Marine parks/

[GBRMPA081]

71 Geomorphological information on the continental shelf, coral reefs and coastline from Fitzroy to Gould Island.

January 1983 - December 1990

ORGANIZATIONS:

Great Barrier Reef Marine Park Authority
P.O. Box 1379
Townsville, Qld 4810

James Cook University of North Queensland (Subcontract)
Department of Geography,
Townsville, Qld 4811

PROJECT LEADERS:

Dr W. Craik (077) 818811
Mr T. Graham

CONTACT OFFICER:

Ms C. Dalliston (077) 818811

EXPENDITURE:

$900 (all years)

MANPOWER:

1.00 (all years)

OBJECTIVE

To investigate terrestrial influence on shelf and reef morphology in an area where reefs are close to the coast.

METHODOLOGY

A combination of aerial photograph interpretation and ground survey will be used to study the geomorphology of the coastline. Reef structure will be investigated by a program of coring on fringing, mid-shelf and outer shelf reefs. Shelf bathymetry and pre-Holocene configuration will be studied from seismic reflection transects, in conjunction with the Bureau of Mineral Resources. A Ewing corer will be used to examine sediments in inter-reef locations and on submerged outer reefs. The growth histories of corals and reefs will be investigated using X- radiographic techniques and C^{14} dating.

STATUS

This project forms part of a post-graduate study. Expected to be completed 1990.

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Geomorphology/Continental shelves/Coral reefs/Coasts/

[GBRMPA056]

72 Stratigraphy of lagoon sediments - Lady Musgrave Island.

June 1984 -

ORGANIZATIONS:
Great Barrier Reef Marine Park Authority
P.O. Box 1379,
Townsville, Qld 4810

University of Sydney, Department of Geology and Geophysics
Sydney, NSW 2006

PROJECT LEADERS:
Ms C. Baldwin (077) 818811
Assoc Prof C.V.G. Phipps (02) 6922924

CONTACT OFFICER:
Ms C. Baldwin

EXPENDITURE:
$0 (this year), $2,700 (all years)

MANPOWER:
0.20 (all years)

OBJECTIVES
To relate reef flat stratigraphy to lagoonal stratigraphy.
2. To define sedimentation rates in the lagoon.
3. To expand upon existing understanding of sedimentation processes and patterns.
4. Supplementary analysis of fresh water wedge under Lady Musgrave Island.

METHODOLOGY
Vibrocores to 6m will be used to study stratigraphy. Supplementary use of boomer lines and shallow drilling will determine sediment thickness and gain substrate information.

LOCALITY: Lady Musgrave Island
GEOGRAPHIC REGION: R
MAJOR DESCRIPTORS: Sedimentation/Lagoons/Stratigraphy/Reefs/

[GBRMPA094]

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73 Holocene high energy window, Great Barrier Reef, Cairns to Cardwell**

February 1983 - December 1988

ORGANIZATIONS:
James Cook University of North Queensland, Department of Geography
Townsville, Qld 4811

Bureau of Mineral Resources, Geology and Geophysics
PO Box 738
Canberra, ACT 2601

PROJECT LEADER:
A/Prof D. Hopley (077) 814817

CONTACT OFFICER:
Mr T. Graham (062) 499111

EXPENDITURE:
$12,000 (all years)

MANPOWER:
0.50 (this year), 3.50 (all years)

EXTERNAL SUPPORT:
MSTGS - $9,150 (1984)

OBJECTIVE
To establish the history of the Holocene Transgression over the north Queensland shelf and relate reef growth to sea level rise. It is thought that for a short period after sea level stabilised and before reef growth had reached this level, a high energy window existed allowing greater energy to reach the mainland coast. Drilling into an extensive Holocene barrier may indicate the period and extent of this high energy episode.

METHODOLOGY
Drilling into outer reefs, fringing reefs and beach barrier systems in the Mourilyan area, north Queensland. Analysis of cores, including radio-carbon dating. Seismic reflection survey.

STATUS
All field work is completed and laboratory analysis of reef and sediment cores is being undertaken. Five outer reefs and two fringing reefs have been drilled.

LOCALITY: Mourilyan
GEOGRAPHIC REGION: R
MAJOR DESCRIPTORS: Holocene/Transgressions/Sea level changes/Reef formation/Energy transfer/

[JAMESC088]

74* Marine sediment studies, north Queensland shelf (MASSNQ).

January 1984 -

ORGANIZATION:
James Cook University of North Queensland,
Department of Geology
Townsville, Qld 4811

PROJECT LEADERS:
Prof R.M. Carter (077) 814536
Dr D.P. Johnson (077) 814756

CONTACT OFFICER:
Dr D.P. Johnson

EXPENDITURE:
$92,230 (this year), $348,130 (all years)

MANPOWER:
8.00 (this year), 19.00 (all years)

EXTERNAL SUPPORT:
MSTGS - $74,000
GBRMPA

OBJECTIVES

1. Delineation of surficial sediment patterns, and processes of sediment dispersal between Cape Upstart and Cape Grafton.
2. Delineation of shallow stratigraphy over same area.
3. Recognition of stratigraphic level of European settlement to assess changes in sedimentation.
4. Documentation of post-glacial shorelines, and role of sea-level in influencing post-glacial sedimentation.

METHODOLOGY

1. Marine surveys using 3.5 kHz PDR, uniboom, sidescan sonar, bottom cameras, vibracorer and grab sampler followed by routine laboratory sedimentary and seismic analysis and radiocarbon dating.
2. Pollen records of cores to establish environments and start of European settlement.
3. Stable isotope (^{13}C) and organic geochemistry studies to determine sources and distribution of organic materials.

STATUS

Work on Innisfail-Cairns sector should be completed by end 1987, apart from report preparation for outer shelf. Work is concentrating on Burdekin- Townsville sector and will extend in 1988-90 to Whitsundays area.

CO-ORDINATION WITH OTHER PROJECTS

Collaboration with physical oceanographic studies by AIMS and other scientists at JCU, pollen work with Geography (Monash), and organic chemistry (Organic Chemistry, Melbourne).

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Stratigraphy/Sedimentation/Shelf geology/

[JAMESC093]

75* Fringing reef development in the south central Great Barrier Reef.

August 1986 - December 1990

ORGANIZATION:
James Cook University of North Queensland,
Sir George Fisher Centre for Tropical Marine Studies
Townsville, Qld 4811

PROJECT LEADER:
A/Prof D. Hopley (077) 814817

CONTACT OFFICER:
Mr R. Van Woesik (077) 814435

EXPENDITURE:
$14,850 (this year), $14,850 (all years)

MANPOWER:
0.70 (this year), 0.70 (all years)

EXTERNAL SUPPORT:
GBRMPA - $14,850
MSTGS - $49,600 (1987/88)

OBJECTIVE

To determine the reasons for the rapid decline in fringing reef development south of a line at about the latitude of Mackay. To the north are reefs equal in size to any part of the Great Barrier Reef province. To the south the reefs are fragmentary.

METHODOLOGY

1. Survey of benthic ecology along line transects.
2. Collection of small *Porites* heads for sectioning and subsequent growth and geochemical analysis.

3. Drilling through the Holocene reefs at locations north and south of the critical line to establish the nature of the foundations and modes and rates of Holocene growth.
4. Analysis of NOAA satellite imagery to determine the patterns of water movement and importance of plumes of rivers such as the Fitzroy and Pioneer.

STATUS

The benthic survey has commenced with results at hand for Goldsmith, Thomas, Carlisle, Brampton, Cockermouth and Scawfell Islands. The geological part of the work commenced in 1987 with drilling of reefs in early 1988.

CO-ORDINATION WITH OTHER PROJECTS

Co-operation with Queensland National Parks and Wildlife Service - survey of islands of the Northumberland and Cumberland Groups.

LOCALITIES: Goldsmith Island; Thomas Island; Carlisle Island; Brampton Island; Cockermouth Island; Scawfell Island

GEOGRAPHIC REGION: R

SHIP TIME REQUIREMENTS: 50 days

MAJOR DESCRIPTORS: Fringing reefs/Benthic environment/Water motion/Reef formation/

[JAMESC086]

76 Mackay region beaches investigation (Mackay City and Pioneer Shire beach).

July 1978 - December 1990

ORGANIZATION:

Queensland Beach Protection Authority
P.O. Box 2595
Brisbane, Qld 4001

PROJECT LEADER:

Mr A.T. Butler (07) 2242829

CONTACT OFFICER:

The Secretary (07) 2242828

OBJECTIVE

To provide a detailed description of beach behaviour in the region to form the basis for the preparation of a comprehensive programme of works and management strategies for improving beach conditions and minimising present and future erosion problems.

METHODOLOGY

1. Collect and assess data on the nature and behaviour of the beaches including factors such as waves, currents, weather and water level changes that influence beach movements.
2. Assess short and long term beach movements and prepare a scheme of works or management procedures for restoration-protection of the beach/dune system.

LOCALITY: Mackay

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Sediment transport/Beach morphology/Coastal zone management/Wave processes on beaches/

[QLDBPA006]

77 Distribution, biostratigraphy and environmental trends of Cainozoic Foraminiferida from the Queensland continental shelf.

ORGANIZATION:

Queensland Department of Mines, Geological Survey Division
GPO Box 194
Brisbane, Qld 4001

PROJECT LEADER:

Dr V. Palmieri (07) 2244166 or 2244929

MANPOWER:

0.00 (this year), 3.00 (all years)

OBJECTIVE

To identify associations of foraminifers and to determine distribution patterns, environmental significance and evolutionary trends of benthic and planktic assemblages in Quaternary, relict and recent associations, and in the subsurface Tertiary.

METHODOLOGY

Qualitative and quantitative analyses of foraminifera from sea bottom sediments, drill core, piston and vibro core samples.

STATUS

Results from areas C and J incorporated with report from ANU research. Results from area Q in report in draft form, completion delayed in favour of mapping in north Queensland. Results from area R published by Palmieri, V., 1984 in Palaeogeography, Palaeoclimatology, Palaeoecology 46, 165-183. Research is under way on the effects of the Messinian salinity crisis in the Capricorn Basin.

CO-ORDINATION WITH OTHER PROJECTS

With projects at School of Earth Sciences, Australian National University, AIMS, Departments of Geology, Queensland and James Cook Universities.

GEOGRAPHIC REGIONS: C,J,R,Q

MAJOR DESCRIPTORS: Cenozoic/Biostratigraphy/Sediment analysis/Evolution/Benthos/Fossil foraminifera/

TAXONOMIC TERMS: Foraminifera

[QGS—002]

78 Distribution of mineral-walled microfossils in upper Quaternary shelfs sediments of the northern Great Barrier Reef.

September 1984 -

ORGANIZATION:

Queensland Department of Mines, Geological Survey Division
GPO Box 194
Brisbane, Qld 4001

PROJECT LEADER:

Dr B.G. Fordham (07) 2244929

OBJECTIVE

To interpret palaeoenvironments on the continental shelf in relation to late Quaternary development of the northern Great Barrier Reef.

METHODOLOGY

Systemic sampling of shallow cores in northern GBR area. Quantitative assessment for mineral-walled microfossils in two fractions each side of 38 microns. Interpreted by comparison with proportional abundances in present day sediments.

STATUS

Some initial sampling carried out. Set aside in favour of Palaeozoic conodont biostratigraphy of northeastern Queensland.

CO-ORDINATION WITH OTHER PROJECTS

Sedimentologic research being carried out by Dr G.R. Orme and colleagues, University of Queensland.

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Quaternary/Fossils/Palaeo studies/Micropalaeontology/

[QGS—007]

79 Geological investigations for coastal zone management.

ORGANIZATION:

Queensland Department of Mines, Geological Survey Division
GPO Box 194
Brisbane, Qld 4001

PROJECT LEADER:

Mr A.W. Stephens (02) 2247086

OBJECTIVES

To apply geological investigations to coastal management projects. Three approaches are used to identify causes and trends in coastal change: (a) historical data, (b) sediment budget/process data, and (c) geological data. The geological data are aimed at producing two types of results:
1. Sedimentological data from modern environments provide information on causal process - sedimentary response, and hence identification of sediment-budget components.
2. This information together with litho-stratigraphic and chrono-stratigraphic data is used to produce a detailed geological history, particularly for the past 7000 years, which can be used as a model for prediction of future trends in coastal change.

METHODOLOGY

Field data collection using airphotos, soil augering, grab sampling, seismic profiling, coring and drilling techniques. Laboratory analyses of texture, composition, and radiometric age. Interpretation of

depositional environments, sediment sources, transport paths, sediment sinks, sediment budgets, seismo-, litho-, and chrono- stratigraphy, and depositional history. Integration to produce a geological model of cause and effect, and to predict future trends in coastal change.

STATUS

Studies have been carried out in the Capricorn Coast, Noosa, and Cairns regions.
Current projects are in the Hervey Bay, Mackay, Bowen, Sunshine Coast, and Townsville/Cairns regions.

CO-ORDINATION WITH OTHER PROJECTS

This project is co-ordinated with several coastal management projects undertaken by the Beach Protection Authority of Queensland.

LOCALITIES: Capricorn Coast; Noosa; Hervey Bay; Mackay; Bowen; Sunshine Coast; Townsville; Cairns

GEOGRAPHIC REGIONS: Q,R

MAJOR DESCRIPTORS: Coastal zone management/Geological surveys/Geological history/Sedimentation/

[QGS—004]

80 Recruitment, dispersal, and distribution of living sedentary foraminifers on selected sites of Heron Island Reef.

December 1983 -

ORGANIZATIONS:

Queensland Department of Mines, Geological Survey Division
GPO Box 194,
Brisbane, Qld 4001

University of Queensland
Department of Geology,
St Lucia, Qld 4067

PROJECT LEADERS:

Dr V. Palmieri (07) 2244166/2244928
Dr J.S. Jell (07) 3772677

CONTACT OFFICER:

Dr V. Palmieri

EXPENDITURE:

$5,200 (this year), $8,950 (all years)

MANPOWER:

0.60 (this year), 0.60 (all years)

EXTERNAL SUPPORT:

MSTGS - $13,500

OBJECTIVE

To investigate the recruitment of sedentary foraminifers and biofouling plates in selected sites of Heron Island Reef and to examine the effect of environmental factors on their recruitment, dispersal and distribution.

METHODOLOGY

Qualitative and quantitative analysis of recruited foraminifers in a determined period of time on biofouling plates positioned along transects of Heron Island Reef.

STATUS

Sixteen stations with twelve biofouling plates each, have now been retrieved from transects of Heron Island Reef. Sediments and coral rubble samples from each station site were collected. Plates were retrieved on a 3 and 6 month period and represent shaded, semishaded, and lighted environments. Encrusting foraminifers pioneer with algae and briozoa the reef edge region. A report is in preparation. Data will be available on request to project leader, after 1986.

LOCALITY: Heron Island

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Ecological distribution/Recruitment/Sedentary species/Protozoans/

TAXONOMIC TERMS: Foraminifera

[QGS—006]

81 Geological investigations in the Swain Reefs.

January 1986 - January 1990

ORGANIZATION:
Queensland Department of Mines, Marine and Coastal Investigations
GPO Box 194
Brisbane, Qld 4001

PROJECT LEADER:
Mr D.E. Searle (07) 2248528

EXPENDITURE:
$8,300 (this year), $18,000 (all years)

MANPOWER:
0.50 (this year), 2.00 (all years)

OBJECTIVE
To investigate the geological controls on the formation of reefs and reefal shoals in the Swain Reefs.

METHODOLOGY
Record continuous seismic reflection profiles and echo soundings to determine morphology, structure, and stratigraphy. Vibra coring at selected sites will provide samples for radiocarbon dating.

STATUS
Detailed seismic and sounding data have been collected at Reef 21-512, where two vibra cores were taken. Some seismic data also collected at Reefs 21-497 and 21-505. Preliminary interpretations in progress. Reference material from vibra cores held in storage. Seismic profiles available as hard copy (contact project leader).

LOCALITY: Swain Reefs
GEOGRAPHIC REGION: R
SHIP TIME REQUIREMENTS: 8 days
MAJOR DESCRIPTORS: Geological surveys/Seismic exploration/Reef formation/Stratigraphy/Radiocarbon dating/

[QLDDM–002]

82* **Ostracoda : Banks Strait, South Pacific.**

ORGANIZATION:
Riverina-Murray Institute of Higher Education, School of Applied Science
PO Box 588
Wagga Wagga, NSW 2650

PROJECT LEADER:
Dr K.G. McKenzie (069) 232550

CONTACT OFFICER:
Mr D.J. Kelso (069) 232224

EXPENDITURE:
$2,040 (all years)

MANPOWER:
0.12 (this year), 0.24 (all years)

EXTERNAL SUPPORT:
AMSTAC-FAP - $2,040

OBJECTIVE
To study the taxonomy of Ostracoda from Banks Strait, Lizard Island and the Southern Pacific, with a view to developing more precise environmental and stratigraphic interpretations of those late Mesozoic and Tertiary Australian sequences with the potential to produce petroleum.

METHODOLOGY
Species picked and mounted on slides.
Scanning electron microscopy.
Description of species, designation of types.
Publication.

STATUS
Banks Strait - all material picked and mounted on slides (27 samples).
Southern Pacific cruises - material picked and mounted on slides from about 60 samples. 2 publications
Lizard Island - material picked, retained in alcohol. 2 publications (by S.J. Hall)
Flinders Island littorals sampled.
Campbell Island sampled and picked; types selected. 1 publication.

LOCALITY: Lizard Island
GEOGRAPHIC REGIONS: B,R,P
MAJOR DESCRIPTORS: Crustaceans/Taxonomy/Biostratigraphy/Environmental factors/
TAXONOMIC TERMS: Ostracoda

[RCAE—003]

83 Pelagic foraminifera in sediments of the continental shelf of eastern Australia.**

January 1981 -

ORGANIZATION:
University of New South Wales, School of Applied Geology
PO Box 1
Kensington, NSW 2033

PROJECT LEADER:
Dr A.N. Carter (02) 6623760

OBJECTIVE
To establish pelagic foraminiferal indices of time and environment for use in studies of the chronostratigraphy and palaeoceanography of sea-floor sediments, principally in the south-eastern Australian region, but also applicable to the whole ocean floor around Australia.

METHODOLOGY
Collection of samples; preparation; selection of assessed specimens; photography by scanning electron microscope; description (where necessary); recording of distribution; synthesis of foraminiferal associations of chronostratigraphical significance; synthesis of foraminiferal associations of environmental significance, particularly in palaeoceanography.

GEOGRAPHIC REGIONS: R,Q,N
MAJOR DESCRIPTORS: Biostratigraphy/Palaeoceanography/Sediment analysis/Chronostratigraphy/ Foraminiferal ooze/
TAXONOMIC TERMS: Foraminifera

[UNINSW009]

84 Analysis of Raine Island beach samples.

September 1985 - June 1989

ORGANIZATION:
University of Queensland, Department of Civil Engineering
St Lucia, Qld 4067

PROJECT LEADER:
Dr M.R. Gourlay (07) 3772543

EXPENDITURE:
$9,650 (all years)

MANPOWER:
0.10 (this year), 0.10 (all years)

EXTERNAL SUPPORT:
Raine Island Corporation.

OBJECTIVE
To determine sediment characteristics and variations, to ascertain their relationship to processes affecting the island and to make comparisons with conditions on other coral cays.

METHODOLOGY
Standard sieving and hydraulic properties analyses. Statistical analyses of grain size distribution data. Historical analysis of shoreline changes and their relationship to meteorological conditions.

STATUS
All samples collected in 1984 have been sieved and the statistical analysis including factor analysis completed. Permeability and minimum fluidizing velocity have been measured for three typical samples. Examination of the composition of selected samples for each group of sediments and measurement of fall velocity have not yet been completed.
Additional material was collected in July-August 1987, together with observations on beach and wave behaviour throughout a full tidal cycle (neaps to springs). The major sources of beach material were also ascertained and observations made on the ecological conditions necessary for its continued production. Analysis of historical shoreline changes and factors affecting them is largely complete. Draft final report on project is in preparation.

LOCALITY: Raine Island
GEOGRAPHIC REGION: R
MAJOR DESCRIPTORS: Coral reefs/Cays/Beaches/Sediment analysis/Grain size/

[UNIQLD090]

85 Coastal processes forming and maintaining the coral cays of the Great Barrier Reef and their implications for marine park management.

January 1984 - December 1989

ORGANIZATION:
University of Queensland, Department of Civil Engineering
St Lucia, Qld 4067

PROJECT LEADER:
Dr M.R. Gourlay (07) 3772543

EXPENDITURE:
$4,000 (this year), $5,000 (all years)

MANPOWER:
0.20 (this year), 0.35 (all years)

EXTERNAL SUPPORT:
GBRMPA

OBJECTIVES

To collect and collate all relevant available material concerning the physical and geomorphological processes which form and maintain coral cays

To provide a basis for interim management guidelines for the cays of the Great Barrier Reef as well as for a subsequent more extensive research programme.

METHODOLOGY

Intensive library research, together with visits to selected cays to assess actual and potential problems likely to be met by management authorities.

STATUS

A preliminary report was completed in 1986. Work continues on writing the final report which will include chapters on: geology and geomorphological processes influencing coral reefs and cays; physical processes on and around coral reef platforms; coral cay formation and stability; human activities and their effects on coral cays; management guidelines for coral cays; bibliography.

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Cays/Coral reefs/Construction/Resource management/Marine parks/

[UNIQLD088]

86 Effect of sediment characteristics on beach profiles and surf-zone hydraulics.

September 1980 - December 1990

ORGANIZATION:
University of Queensland, Department of Civil Engineering
St Lucia, Qld 4067

PROJECT LEADER:
Dr M.R. Gourlay (07) 3772543

EXPENDITURE:
$38,715 (all years)

EXTERNAL SUPPORT:
MSTGS - $38,715

OBJECTIVES

To obtain a deeper understanding of some of the processes which are involved in the formation of beaches in general. To use the results of this work to help explain the behaviour of beaches on Heron Island and other places.

To determine the influence of various beach materials with different sediment characteristcs upon surf zone hydraulics and beach profiles produced by various wave conditions.

METHODOLOGY

1. Two dimensional laboratory flume investigation of beach profiles formed under various wave conditions combined with a comparison with field data, as available and as appropriate. Measurements have been made of equilibrium beach profiles and the hydraulic process producing them such as wave transformation through surf zone, mean water level changes (wave set-up), breaker type, etc.
2. Measurement of beach material properties in particular those of hydraulic significance such as fall velocity, fluidizing velocity, and permeability.

STATUS

Experimental beach profile data at constant wave period was available for two beach materials of known properties from a previous research program. This data has been analysed and the initial results presented in report form. The recent program involved further experiments with two more beach materials and a different wave period. Two series of beach profile tests at two different wave periods using fine beach pebbles and a final test series using a medium sand have now been completed. Basic analyses of all results have been completed and some conclusions have been drawn. Test data are currently being used to interpret beach and sediment data from Raine Island on the outer northern Great Barrier Reef. Full analysis of data and final report have not yet been completed.

LOCALITY: Heron Island

GEOGRAPHIC REGIONS: R,X
MAJOR DESCRIPTORS: Beaches/Beach accretion/Surf zone/Sediment transport/Hydrodynamics/

[UNIQLD008]

87 Impact of coastal engineering works upon coral cays.

January 1979 - December 1989

ORGANIZATION:
University of Queensland, Department of Civil Engineering
St Lucia, Qld 4067

PROJECT LEADER:
Dr M.R. Gourlay (07) 3772543

MANPOWER:
0.20 (this year), 0.80 (all years)

OBJECTIVE

To study the effects of coastal development and construction activities upon the stability of coral cays, with particular reference to beach processes. Specifically, the effects of seawalls and the dredged channels at Heron Island are being considered, together with the influence of varying climatic conditions upon the processes which determine the alignment of the Island's beaches.

METHODOLOGY

1. Study of all available historical evidence and previously published information on the physical processes shaping coral cays in general and on developmental activities at Heron Island in particular.
2. Limited field observations of the beach alignment and sedimentation in the boat harbour to extend data available from other sources.
3. Detailed analysis of wind, sea and swell observations from various locations near Heron Island for a period of 20 years to determine seasonal and longer term variations in wave climate influencing Heron Island.
4. Estimation of waves and surge from a severe cyclone coming from the worst possible direction at high tide.

STATUS

The historical sequence of events and development at Heron Island has been recorded and the importance of winds, waves and tides in shaping the cay has been established.
It has been shown that the combined effects of a seawall, constructed on the most unstable portion of the island, and a dredged boat channel through the reef rim have been responsible for sand eroded by waves from the island's beaches being removed by tidal currents from the reef platform. This loss of sand from the reef can be remedied by restoring and reinforcing walls around the boat channel to a height equal to that of the nearby reef edge.
The influence of specific cyclones for which hind cast wave data is now available is being considered in relation to past shoreline changes and damage to harbour facilities.

LOCALITY: Heron Island
GEOGRAPHIC REGION: R
MAJOR DESCRIPTORS: Cays/Construction/Dredging/Environmental impact/Erosion/

[UNIQLD007]

88* Structure and evolution of the south east Australian continental margin.

January 1987 -

ORGANIZATION:
University of Sydney, Ocean Sciences Institute
Sydney, NSW 2006

PROJECT LEADERS:
Dr G.H. Packham (02) 6922279
Mr T.C.T. Hubble (02) 6922279

CONTACT OFFICER:
Dr G.H. Packham

METHODOLOGY

This project utilizes sparker surveys over the outer shelf and upper slope sediment wedge, dredge samples from depths down to 4300 m and cores from the upper slope sediment wedge. The sediments of that wedge are Pliocene to Pleistocene. At the bottom of the slope next to the abyssal plain lie marginal marine Late Cretaceous sediments. Their present depth of 4200 m indicates margin subsidence greater than expected from a simple thermal contraction model. The basement rocks dredged include metamorphosed sediments and basic igneous rocks presumed to be Ordovician. A haul of well preserved Early Devonian corals was also obtained from the slope. Serpentinites have been found at several sites. Dating of granites has identified an additional mass of mid- Cretaceous age offshore from Montague Island on the slope and granites akin to the Bega Batholith near the foot of the slope.

LOCALITY: Montague Island
GEOGRAPHIC REGIONS: N,Q,R,Z
MAJOR DESCRIPTORS: Continental shelves/Continental slope/Sedimentation/Geological history/

[UNISYD157]

89* **Submerged reefs and terraces on the shelf edge adjacent to the Great Barrier Reef.**

January 1987 -

ORGANIZATIONS:
University of Sydney, Ocean Sciences Institute
Sydney, NSW 2006
Bureau of Mineral Resources, Geology and Geophysics
GPO Box 378
Canberra, ACT 2601

PROJECT LEADERS:
Dr P.T. Harris (02) 6922279
Dr P.J. Davies (062) 499111

CONTACT OFFICER:
Dr P.T. Harris

OBJECTIVE
To study the morphology and distribution of seabed features on the shelf edge and upper slope adjacent to the Great Barrier Reef.

METHODOLOGY
Shalow seismic profiling, side-scan sonar and precision echo sounding in a BMR *Rig Seismic* program.

STATUS
The data reveal the presence of what are interpreted as drowned barrier reefs and terraces at locations between 15°45'S and 21°00'S. Such features are important in understanding relative sea level curves and for modelling the growth and development of the Great Barrier Reef. The second stage of research in this area is presently underway examining gravity and vibro-cores supplemented with shallow (boomer) seismics from a transect of the continental shelf east of Townsville.

GEOGRAPHIC REGION: R
MAJOR DESCRIPTORS: Ocean floor/Topographic features/Barrier reefs/Continental shelves/Geomorphology/

[UNISYD156]

See also:

200 FOSSIL BIOTA: Submerged Halimeda banks.
247* Role of crown of thorns starfish *Acanthaster planci* in reef degradational processes: historical perspective and current influence.

90* **Biological control of bopyrid parasites of commercial prawns using liriopsid hyperparasites.**

March 1986 - March 1988

ORGANIZATION:
James Cook University of North Queensland, Graduate School of Tropical Veterinary Science
Townsville, Qld 4811

PROJECT LEADER:
Dr L. Owens (077) 814632

MANPOWER:
0.10 (this year), 0.10 (all years)

EXTERNAL SUPPORT:
Rural Credits Development Fund - $64,264

OBJECTIVE
To assess the feasibility of introducing a liriopsid hyperparasite into the Gulf of Carpentaria to control bopyrid parasites of commercial penaeid prawns.

METHODOLOGY
Sites where liriopsids are abundant on the eastern coast of Queensland will be determined. Then, methodologies to transport live liriopsids will be developed, eg cryopreservation in essential media, on live prawns.

STATUS
The liriopsid has been identified as *Cabriops orbionei* and is present from Torres Strait to Ayr on the east coast of Queensland. Bopyrids are most heavily infected in autumn with prevalence decreasing through winter and spring. Efforts to model the introduction of the hyperparasite to the Gulf of Carpentaria will be attempted in 1988.

Completed Project - This project will remain in the computerized Register for another 5 years but will not be included in future issues of the Compendium.

GEOGRAPHIC REGIONS: R,C
MAJOR DESCRIPTORS: Biological control/Parasites/Prawn fisheries/
TAXONOMIC TERMS: Cabriops orbionei; Bopyridae; Penaeidae

[JAMESC098]

91 Factors affecting growth of *Aphanothece* in a solar salt field.**

ORGANIZATION:
James Cook University of North Queensland,
Department of Botany
Townsville, Qld 4811

PROJECT LEADER:
Prof D.J. Griffiths

EXPENDITURE:
$31,000 (this year)

MANPOWER:
1.00 (this year)

EXTERNAL SUPPORT:
Cheetham Salt Limited
ICI Pty Ltd

OBJECTIVE
To examine growth of algae in the hypersaline conditions of a solar salt field with special emphasis on the cyanobacterium *Aphanothece* and its effect on viscosity in the higher salinity ponds.

METHODOLOGY
Standard taxonomic and quantitative techniques. Standard limnological methods for nutrient analysis and monitoring of other parameters relevant to algal growth.

GEOGRAPHIC REGION: R
MAJOR DESCRIPTORS: Salt lakes/Evaporation ponds/Algae/Viscosity/
TAXONOMIC TERMS: Aphanothece

[JAMESC104]

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92 Establishment of horsetail she-oak (*Casuarina equisetifolia* var *incana*) in the dry tropics.

December 1985 - December 1989

ORGANIZATION:
Queensland Beach Protection Authority
GPO Box 2595,
Brisbane, Qld 4001

PROJECT LEADER:
Mr A.T. Butler (07) 2242829

CONTACT OFFICER:
The Secretary (07) 2242828

OBJECTIVE
To identify planting techniques which will improve the early survival of horsetail she-oak in the dry tropics.

METHODOLOGY
Collect and assess data.

GEOGRAPHIC REGION: R
MAJOR DESCRIPTORS: Vegetation cover/Survival/Tropical environment/Coastal zone management/
TAXONOMIC TERMS: Casuarina equisetifolia

[QLDBPA020]

93* Floristic inventory of continental islands in the Capricorn section of the Great Barrier Reef region.

September 1986 - December 1990

ORGANIZATIONS:
Queensland Department of Primary Industries, Queensland Herbarium
Botany Branch and Queensland Herbarium
Meiers Road
Indooroopilly, Qld 4068

Queensland National Parks and Wildlife Service
Marine Parks
PO Box 1395
Rockhampton, Qld 4700

PROJECT LEADERS:
Mr G.N. Batianoff (07) 3779321
Mr S. Domm (079) 276511

CONTACT OFFICER:
Mr G.N. Batianoff

MANPOWER:
0.80 (this year), 3.50 (all years)

OBJECTIVES

1. To produce inventories of the flora and vegetation of the Cumberland, Northumberland and Keppel Bay group of islands.
2. To describe botanical resources for the use of management authorities.
3. To collect voucher specimens for Queensland Herbarium database (HERBRECS).

METHODOLOGY

Ecological survey including photointerpretation, vegetation sampling and recording along transects, specimen collection, identification and data processing.
Numerical analysis is used to examine floristic diversities.
Lists of rare, endemic and/or relic plants are compiled.

STATUS

1. Preliminary management reports for Cumberland and Keppel Bay Islands have been completed by Mr S. Domm (QNPWA Rockhampton).
2. First botanical data on hand indicate that the flora of continental islands is very diverse i.e. over 300 plant species are recorded for most larger islands. Major plant discoveries include (i) collecting *Albizia* sp. (Batianoff 6052) on Penrith and Scawfell Islands, (ii) new acacia now described as *Racosperma polyadenium* Pedley on Shaw and Thomas Islands.

CO-ORDINATION WITH OTHER PROJECTS

Some contacts are maintained with Queensland University Geography and Botany Departments. Australian Littoral Society (ALS) assisted in earlier field trips in 1986.

LOCALITIES: Keppel Isles; Cumberland Isles; Northumberland Isles
GEOGRAPHIC REGION: R
SHIP TIME REQUIREMENTS: 6 days
MAJOR DESCRIPTORS: Plant populations/Check lists/Botanical resources/Coral reefs/Islands/
TAXONOMIC TERMS: Albizia; Racosperma polyadenium

[QDPI—060]

94 Structure and physiology of mycorrhizas of plants of coral islands.

June 1979 - December 1988

ORGANIZATIONS:

University of New South Wales, School of Botany
PO Box 1
Kensington, NSW 2033

University of Sydney, School of Biological Sciences
Sydney, NSW 2006

PROJECT LEADERS:

Dr A.E. Ashford (02) 6622716 (University of New South Wales)
Dr W.G. Allaway (02) 6922280 (University of Sydney)

CONTACT OFFICER:

Dr A.E. Ashford

EXPENDITURE:

$25,000 (this year), $60,000 (all years)

MANPOWER:

1.50 (this year), 3.00 (all years)

EXTERNAL SUPPORT:

ARGS - $24,355

OBJECTIVES

To investigate the anatomy of the mycorrhiza of *Pisonia grandis* and its involvement in nutrition and water balance of this species, with particular reference to nutrient inputs from nesting and roosting birds.
To survey other higher-plant species of coral islands for the presence of mycorrhizas and for root structure.

METHODOLOGY

Small samples of roots are fixed for histochemical and ultrastructural studies, embedded and sectioned for light and electron microscopy. Roots and soils are analysed for chemical and nutrient composition. Seeds of mycorrhizal species will be collected for growth in sterile culture, and subsequent re-infection with mycorrhizal fungus. It is intended to identify the fungal partner(s) in the mycorrhizal(s), and to investigate nutrient flow in the field.

STATUS

Investigations of anatomy of *Pisonia grandis*, nutrient input from birds, a survey of mycorrhizal status of species, comparison with material from Seychelles and electron microscopy have been published.

Mycorrhizal synthesis and nutritional physiology are in progress.

LOCALITY: Capricorn Group
GEOGRAPHIC REGION: R
MAJOR DESCRIPTORS: Atolls/Plant nutrition/Fungi/Interspecific relationships/
TAXONOMIC TERMS: Pisonia grandis

[UNINSW013]

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95 **Studies of genomic DNA of *Prochloron*.**

January 1985 -

ORGANIZATION:
University of Sydney, School of Biological Sciences
Building A12
Sydney, NSW 2006

PROJECT LEADER:
Assoc Prof A.W.D. Larkum (02) 6922069

EXPENDITURE:
$5,000 (this year), $26,500 (all years)

MANPOWER:
1.20 (this year), 2.60 (all years)

EXTERNAL SUPPORT:
ARC - $17,000

OBJECTIVE
To clone the gene for the chlorophyll a/b light-harvesting protein and other genes of the prokaryotic alga *Prochloron* sp. and to carry out genomic mapping.

METHODOLOGY
DNA is extracted, cut by restriction endonucleases and inserted into PBR 322 plasmids of *Escherichia coli*. The chlorophyll a/b gene is screened for using rabbit antibody to this protein. Cross-hybridization with probes to higher plant chlorophyll a/b light-harvesting protein and probes to other genes is also being tried.

STATUS
Preliminary work on cross-hybridization with probes to the higher plant chlorophyll a/b light-harvesting gene. Antibody to the protein of *Prochloron* was raised. A number of positive clones have been isolated from a lambda GTII library but all have proven false so far. The atp genes have been isolated in clones and preliminary sequences established.

GEOGRAPHIC REGION: R
MAJOR DESCRIPTORS: Algae/Genetics/Proteins/
TAXONOMIC TERMS: Prochloron; Escherichia coli

[UNISYD104]

See also:

60 Nutrient dynamics on coral cays.
139* Algal-invertebrate symbioses in tropical marine waters.

96** Systematics and ecology of tropical Australian marine macroalgae.

January 1968 -

ORGANIZATION:
James Cook University of North Queensland,
Department of Botany
Townsville, Qld 4811

PROJECT LEADER:
Dr I.R. Price (077) 814133 or (077) 814427

MANPOWER:
0.10 (this year), 3.10 (all years)

OBJECTIVE

To prepare systematic handbooks of the marine algal flora of tropical Australia, including descriptions, illustrations, keys for identification, and habitat, distribution, and phenological data.

METHODOLOGY

A comprehensive collection of marine benthic algae from representative areas and habitats in tropical Australia, particularly along the eastern coast of North Queensland and including the Great Barrier Reef, is being assembled. Data on distribution, habitat, seasonality, vegetative and reproductive structure and development, taxonomy, and phenology are being determined for each species. Relevant material from other parts of Australia and overseas is also being obtained for comparison.
Emphasis was initially placed on the genus *Caulerpa* . At present, the turf-forming species of coral reefs are being extensively studied, and a systematic handbook should be available in the next few years.

STATUS

Probably the most comprehensive collection of tropical Australian seaweeds in the country has been built up at the James Cook University. The studies already completed, and the collections assembled, provide a significant foundation for future research in the region.
Futher collections from particular regions and habitats are required, and considerable research into the structure and systematics of the species present remains to be carried out.

GEOGRAPHIC REGIONS: C,J,R

MAJOR DESCRIPTORS: Tropical zones/Taxonomy/Ecology/Handbooks/Algae/Seaweeds/

[JAMESC050]

97 Taxonomic studies of benthic marine algae.

January 1973 -

ORGANIZATION:
Murdoch University, School of Biological and
Environmental Sciences
Murdoch, WA 6150

PROJECT LEADERS:
Dr M.A. Borowitzka (09) 3322333
Dr J. Huisman (09) 3322333

CONTACT OFFICER:
Dr M.A. Borowitzka

EXPENDITURE:
$31,047 (this year), $51,547 (all years)

MANPOWER:
1.50 (this year), 4.00 (all years)

EXTERNAL SUPPORT:
ARC - $31,047

OBJECTIVE

To improve our understanding of the systematics and taxonomy of a range of benthic marine algae, especially the Corallinaceae, the Caulerpales and the Ceramiales towards an algal flora for WA.

METHODOLOGY

A wide range of collecting methods are being used and the algae are being studied in various ways depending upon the genus.

STATUS

1. Studies on the crustose coralline algae of the GBR (essentially completed).
2. The algae of Port Jackson (initial collection and curation are complete).
3. The algae of central N.S.W. (curation of specimens is in progress).
4. The benthic algae of southern W.A. (studies of selected genera are under way and further collections are being made).
5. Revision of problem species and genera.

CO-ORDINATION WITH OTHER PROJECTS

Parts of this project have been carried out in collaboration with the Australian Institute of Marine Science (GBR crustose coralline algae); the Smithsonian Institution, Washington, D.C.; the Roche Research Institute of Marine Pharmacology; C.S.I.R.O. Division of Fisheries, Marmion, W.A.; and other Institutions.

GEOGRAPHIC REGIONS: W,E,R,O,N

MAJOR DESCRIPTORS: Algae/Benthic zone/Taxonomy/

TAXONOMIC TERMS: Corallinaceae; Caulerpaceae; Galaxaura; Ceramiales; Liagora

[MURUNI013]

98* **Taxonomy and biology of estuarine algae.**

January 1983 -

ORGANIZATION:

University of New South Wales, School of Botany
PO Box 1
Kensington, NSW 2033

PROJECT LEADER:

Dr R.J. King (02) 6972066

EXPENDITURE:

$3,800 (this year), $8,000 (all years)

MANPOWER:

1.80 (this year), 5.80 (all years)

EXTERNAL SUPPORT:

Joyce - Vickery Scientific Research Fund. - $500

OBJECTIVES

To describe the distribution of estuarine macro-algae, especially those associated with saltmarsh and mangrove.
To revise the taxonomy of algae of the *Bostrychia-Caloglossa* association.

METHODOLOGY

The distributions of macroalgae associated with mangroves are mapped in local areas to relate them to environmental variables. The effect of salinity on growth and productivity is being measured in the laboratory. Collections of algae have been extended to Western Australia, Northern Territory and Gulf of Carpentaria (Australia) as well as New Zealand.

STATUS

Work is continuing on the northern Australian collection. The genera *Bostrychia* and *Caloglossa* are receiving special attention and two taxonomic contributions on *Bostrychia* have been published, and a monograph on the Bostrychioideae prepared for publication.

GEOGRAPHIC REGIONS: C,R,Q,N

MAJOR DESCRIPTORS: Algae/Ecological distribution/Mangrove swamps/Taxonomy/Estuarine organisms/

TAXONOMIC TERMS: Bostrychia; Caloglossa; Bostrychioideae

[UNINSW040]

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99 **Systematic and ecological studies on the marine algae of Queensland.**

January 1953 -

ORGANIZATION:

University of Queensland, Department of Botany
St Lucia, Qld 4067

PROJECT LEADER:

Dr A.B. Cribb (07) 3772728

EXPENDITURE:

$8,000 (this year), $30,000 (all years)

MANPOWER:

0.20 (this year), 4.00 (all years)

OBJECTIVES

To prepare a handbook of the algal flora of Queensland.
To prepare ecological accounts of algal vegetation.

METHODOLOGY

Field observations and collecting, laboratory examination and determination of specimens, preparation of descriptions and figures; all phases proceeding simultaneously.

STATUS

Seven papers on systematic aspects and one on ecological aspects published.

GEOGRAPHIC REGIONS: Q,R

MAJOR DESCRIPTORS: Algae/Taxonomy/Ecology/Handbooks/

[UNIQLD002]

100 Systematics and ecological studies on the algae of the Southern Great Barrier Reef.

January 1965 -

ORGANIZATION:

University of Queensland, Department of Botany
St Lucia, Qld 4067

PROJECT LEADER:

Dr A.B. Cribb (07) 3772728

EXPENDITURE:

$400 (this year), $12,000 (all years)

MANPOWER:

0.20 (this year), 4.00 (all years)

EXTERNAL SUPPORT:

GBRMPA - $1,100

OBJECTIVES

To prepare a handbook of the algal flora of the southern Great Barrier Reef.
To prepare ecological accounts of algal vegetation of various reefs.

METHODOLOGY

Field observations and collecting; laboratory examination - determination of specimens; preparation of descriptions and figures; all phases proceeding simultaneously.

STATUS

One volume published.

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Reefs/Algae/Taxonomy/Ecology/Handbooks/

[UNIQLD004]

See:

93* Floristic inventory of continental islands in the Capricorn section of the Great Barrier Reef region.

101 COASTAL PELAGIC RESOURCES: Taxonomy of baitfish.

June 1987 - June 1991

ORGANIZATION:

Australian Institute of Marine Science
PMB No. 3
MC Townsville,
Qld 4810.

PROJECT LEADERS:

Dr D. Williams (077) 789211
Dr J. Benzie
Dr A. Robertson

CONTACT OFFICER:

Dr D. Williams

OBJECTIVE

To clarify the systematics of clupeid baitfish and associated billfish through the application of biochemical genetic techniques.

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Bait fish/Taxonomy/Stock assessment/Population genetics/

TAXONOMIC TERMS: Clupeidae

[AIMS10607]

102 POPULATION GENETICS AND EVOLUTION IN CORALS: DNA hybridisation in corals.

June 1986 - June 1991

ORGANIZATIONS:

Australian Institute of Marine Science
PMB No. 3
MC Townsville,
Qld 4810.

James Cook University of North Queensland

PROJECT LEADERS:

Dr J. Veron (077) 789211
Dr D. Yellowlees
Dr D. Miller

CONTACT OFFICER:

Dr J. Veron

OBJECTIVE

To use the technique of DNA hybridisation to test taxonomic affinities of corals.

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Coral/DNA/Chemotaxonomy/

[AIMS20905]

103** Humpback whale songs and related behaviour.

January 1986 - December 1988

ORGANIZATIONS:

Australian Museum
Vertebrate Zoology
6-8 College Street
Sydney NSW 2000

Defence Science and Technology Organisation
Ocean Sciences Group
PO Box 706
Darlinghurst, NSW 2016

PROJECT LEADERS:

Dr W.H. Dawbin (02) 3398111 (Museum)
Dr D.H. Cato (02) 6921483

CONTACT OFFICER:

Dr D.H. Cato

EXPENDITURE:

$10,000 (this year)

MANPOWER:

1.00 (this year)

EXTERNAL SUPPORT:

MSTGS - $10,000

OBJECTIVES

1. To record humpback whale sounds during migration along east and west coasts of Australia concurrently with behavioural observations relating sound production and behaviour.
2. To analyse the sounds to determine the song pattern.
3. To determine temporal (monthly and yearly) variation and geographical variation of the song.
4. To compare the songs with those described from other regions such as Hawaii, California and the West Indies to identify the scale of regional differences.
5. To evaluate the value of songs for delimiting separate breeding stock.

METHODOLOGY

Sounds will be tape recorded using a hydrophone suspended from a boat in vicinity of a headland where observers will monitor whale movements and behaviour. A theodolite will be used on the headland for position fixing. Locations and times of monitoring will be chosen from known migration patterns of the whales. Spectrograms (sonagrams) and frequency spectra will be produced from the recordings using Kay and Hewlett Packard equipment, from which an analysis of song pattern and acoustic characteristics will be made.

STATUS

Data obtained in 1986 showed fundamental differences in songs off eastern Australia compared with those off western Australia.

CO-ORDINATION WITH OTHER PROJECTS

There is an exchange of data with Dr Roger Payne, Long Term Research Institute, Massachusetts USA who coordinates several northern hemisphere whale studies.

GEOGRAPHIC REGIONS: R,Q,N,B,W,E

SHIP TIME REQUIREMENTS: 20 days.

MAJOR DESCRIPTORS: Mammals/Sound production/Behaviour/Comparative studies/

TAXONOMIC TERMS: Cetacea

[AUSMUS018]

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104 Biological basis for managing populations of dugongs and other marine mammals in the Great Barrier Reef Marine Park.

November 1983 - May 1989

ORGANIZATIONS:

Great Barrier Reef Marine Park Authority
PO Box 1379
Townsville, Qld 4810

James Cook University of North Queensland
(Subcontract)
Post Office
James Cook University, Qld 4811

PROJECT LEADERS:

Ms C. Baldwin (077) 818811
Dr H.D. Marsh (077) 814242

CONTACT OFFICER:

Dr H.D. Marsh

EXPENDITURE:

$4,133 (this year), $181,181 (all years)

MANPOWER:

0.50 (this year), 3.00 (all years)

OBJECTIVES

To develop an effective regime for monitoring dugong populations in northern Australia.
To obtain relevant management information on dugongs.
To coordinate information on man-induced dugong mortality.
To obtain, collate and analyse information on other marine mammals.

METHODOLOGY

Aerial surveillance, specific dugong aerial surveys, specimen collection and analysis, collection of data on incidental sightings, collection of data on catches of dugong.

STATUS

Field work completed. Final report submitted to GBRMPA.

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Mammals/Population characteristics/Mortality/Man-induced effects/Resource management/

TAXONOMIC TERMS: Dugong dugon

[GBRMPA084]

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105 Distribution and abundance of larval fishes in the nearshore waters of Lizard Island.

January 1987 -

ORGANIZATIONS:

Great Barrier Reef Marine Park Authority
PO Box 1379
Townsville, Qld 4810

Griffith University, School of Australian
Environmental Studies (Subcontract)
Nathan, Qld 4111

PROJECT LEADER:

Ms M. Milicich (07) 2757111

EXPENDITURE:

$1,680 (all years)

EXTERNAL SUPPORT:

Lizard Island Research fellowship - $4,000

OBJECTIVE

To examine various facets of the light trap sampling technique. To test for integrity and consistency of patchiness in fish distribution. To relate distribution of fish in the nearshore environment to distribution measured after settlement.

METHODOLOGY

Light traps will be deployed to sample the supply of larvae from neighbouring reefs. Current drogues will be deployed concurrently to the major programme to describe the small scale current patterns around the study sites.

STATUS

Fish larvae have been sampled for the period Summer 1986-87.

CO-ORDINATION WITH OTHER PROJECTS

To be coordinated with the study by Mr M. Meekan on recruitment rates of coral reef fisheries at Lizard Island.

LOCALITY: Lizard Island

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Fish larvae/Population number/Biological sampling/Coastal zone/Samplers/

[GBRMPA180]

106 Population dynamics of crown of thorns starfish on Suva Barrier Reef, Fiji.

September 1985 - December 1990

ORGANIZATIONS:

Great Barrier Reef Marine Park Authority
PO Box 1379
Townsville Qld 4810

University of the South Pacific
Box 1168
Suva, Fiji

PROJECT LEADERS:

Dr L. Zann (077) 818811
Mr J. Brodie

CONTACT OFFICER:

Dr L. Zann

EXPENDITURE:

$3,000 (this year), $7,400 (all years)

OBJECTIVES

To monitor growth, abundance and distribution of populations of juvenile and adult crown of thorns starfish on a coral reef.
To continue the monitoring program started in 1979.

METHODOLOGY

Monthly sampling of distribution and abundance of starfish.

STATUS

Monthly reports have been produced. Continued sampling in 1989 subject to recruitment. Annual monitoring of recruitment continuing. Results 1979-87 published.

LOCALITY: Fiji

GEOGRAPHIC REGION: P

MAJOR DESCRIPTORS: Population dynamics/Crown of thorns starfish/Coral reefs/Monitoring/

TAXONOMIC TERMS: Acanthaster planci

[GBRMPA115]

107 Population dynamics of eastern Australian green turtles: Capricornia Section Breeding Unit.

November 1986 -

ORGANIZATIONS:

Great Barrier Reef Marine Park Authority
PO Box 1379
Townsville, Qld 4810

Queensland National Parks and Wildlife Service
Department of Environment and Conservation
POBox 155
Brisbane North Quay, Qld 4002

PROJECT LEADERS:

Ms C. Baldwin (077) 818811
Dr C. Limpus (077) 741411

CONTACT OFFICER:

Ms C. Baldwin

EXPENDITURE:

$20,000 (this year), $60,000 (all years)

OBJECTIVE
To study population dynamics of green turtles in the southern Great Barrier Reef; to develop models and monitoring regime.

METHODOLOGY
Feeding ground surveys, nesting population survey; genetic analysis of breeding unit; hatching productivity; population models at Heron and adjacent reefs and Shoalwater and northern Repulse Bays.

STATUS
Field work for 1987/88 involving sampling, tagging of green turtles in the Capricornia and Shoalwater and northern Repulse Bay feeding grounds; and studies of population and incubation success in Capricornia nesting beaches. Data analysis proceeding as planned.

GEOGRAPHIC REGION: R
MAJOR DESCRIPTORS: Turtle fisheries/Population dynamics/Mathematical models/Biological surveys/
TAXONOMIC TERMS: Cheloniidae

[GBRMPA177]

108 Spawning, recruitment and juvenile ecology of coral reef fishes at Lizard Island, northern Great Barrier Reef.

January 1987 -

ORGANIZATIONS:
Great Barrier Reef Marine Park Authority
PO Box 1379
Townsville, Qld 4810
Griffith University, School of Australian Environmental Studies (Subcontract)
Nathan, Qld 4111

PROJECT LEADER:
Mr M. Meekan (07) 2757111

EXPENDITURE:
$1,720 (all years)

OBJECTIVES
To measure rates of larval production of a common reef fish.
To examine settlement rates of the species over three years.
To examine post-settlement mortality and growth.

METHODOLOGY
The study will utilize proven sampling methods to measure the production of larval *Pomacentrus amboinensis* , the settlement rate of that larvae, and then priority of settlement and survivorship.

STATUS
A pilot study to examine patterns of settlement of reef fishes to coral heads in three different habitats has been completed. Further investigations will focus on those pomacentrid species which settled in relatively higher numbers.

CO-ORDINATION WITH OTHER PROJECTS
To be coordinated with the study by Ms M. Milicich on spatial and temporal abundance of larvae.

LOCALITY: Lizard Island
GEOGRAPHIC REGION: R
MAJOR DESCRIPTORS: Reef fish/Spawning/Recruitment/Juveniles/Larval settlement/
TAXONOMIC TERMS: Pomacentridae; Pomacentrus amboinensis

[GBRMPA181]

109 Studies of diseases of the crown of thorns starfish.

January 1986 -

ORGANIZATIONS:
Great Barrier Reef Marine Park Authority
PO Box 1379
Townsville Qld 4810

James Cook University of North Queensland
Post Office
James Cook University, Qld 4811

PROJECT LEADERS:
Dr L. Zann (077) 818811
Prof R.S.F. Campbell (077) 814111

CONTACT OFFICER:
Dr L. Zann

EXPENDITURE:
$7,000 (this year), $69,954 (all years)

EXTERNAL SUPPORT:
MSTGS
COTSAC

OBJECTIVE
To obtain data on naturally occurring diseases (bacteria, viral, and parasitic) by identifying and characterising specific diseases and gathering epidemiological data.

METHODOLOGY
Collection, statistical planning and analysis of epidemological through laboratory studies involving tissue culture and virus isolation.

STATUS
Study continuing. Diseased juveniles and adults from Fiji collected and EMs prepared. Pathogen identified as sporazoan. Diseased/moribund specimens from Great Barrier Reef and aquaria have been collected. Production of tissue cultures for growth studies underway. Atlas of *Acanthaster planci* organs and tissues in preparation.

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Crown of thorns starfish/Pathology/Diseases/Coral/Predator control/Epidemiology/

TAXONOMIC TERMS: Acanthaster planci

[GBRMPA119]

110** Feeding and breeding ecology of seabirds.

August 1973 -

ORGANIZATION:
Griffith University, School of Australian Environmental Studies
Nathan, Qld 4111

PROJECT LEADER:
Dr K. Hulsman (07) 2757520

EXPENDITURE:
$600 (this year), $28,269 (all years)

MANPOWER:
0.10 (this year), 3.36 (all years)

EXTERNAL SUPPORT:
GBRMPA - $14,300 (Aerial photographs of islands in the Capricornia Section.)
Co-ordinator General, Premier's Department (Queensland) - $10,400

OBJECTIVES
To gather information about the ecology of seabirds, that is needed to manage their populations in the Capricornia Section of the Marine Park. We are addressing these general questions:
(a) What population size is necessary for the long term survival of each species of seabird that breeds in the region?
(b) What islands are needed as breeding grounds for the long-term survival of these species?
(c) What is the direct and indirect impact of human activity on the survival of each species?
(d) What do seabirds eat and over what area of ocean around colonies does each species of seabird forage?
In order to answer these general questions, population parameters, such as, size of breeding and non-breeding populations, breeding success, rate of recruitment, causes of mortality and the amount of resources (nesting areas and food) needed must be measured.

METHODOLOGY
Islands are visited several times during the breeding season. Visits are timed to enable our measuring of number of pairs, hatching and fledging success. Populations are censused by absolute or relative counts (transects or quadrats). Banding birds with colour and/or metal bands can provide data on interchange of birds between colonies, age structure of population, recruitment and dispersal of birds.

Aerial photographs can be used to measure the area suitable for each species to nest in provided the characteristics of the nesting areas are known. Field experiments will resolve what portion of suitable area is available for nesting.
Number of each species foraging along belt transects between islands will provide data on distances that each species hunts from its colonies. Some colonies are observed for extended periods during which causes of mortality of eggs and chicks, growth rates of chicks and size and type of prey can be determined.

STATUS

All seabird colonies in the Capricornia Section of the GBR Marine Park were censused during two successive breeding seasons (1982-83 & 1983-84). The following were determined: The distribution and size of breeding colonies of each species of seabird, reproductive output, movement of species, features of nesting areas of each species and where each species foraged. These data are being used to develop possible management strategies. The most promising means to protect seabird colonies appears to be to increase the public's awareness about what seabirds require to breed successfully and so decrease levels of disturbance to breeding birds.

LOCALITIES: Capricorn Group; Bunker Group
GEOGRAPHIC REGION: R
SHIP TIME REQUIREMENTS: 54
MAJOR DESCRIPTORS: Birds/Population characteristics/Feeding behaviour/Reproductive behaviour/ Biological surveys/Resource management/

[GRIFFI002]

111 Ageing techniques for the crown-of-thorns starfish, *Acanthaster planci*.

January 1987 - June 1990

ORGANIZATION:
James Cook University of North Queensland
Townsville, Qld 4811

PROJECT LEADER:
Assoc Prof J.S. Lucas (077) 814412

CONTACT OFFICER:
Mr R. Stump (077) 814883

EXPENDITURE:
$20,500 (this year), $30,000 (all years)

MANPOWER:
1.30 (this year), 2.50 (all years)

EXTERNAL SUPPORT:
AIMS/COTSAC - $30,000

OBJECTIVES

1. To test the effectiveness of marking starfish with a tetracycline skeletal band for growth measurements.
2. To validate the periodicity of natural pigment bands and internal growth lines occurring in skeletal elements.
3. To study the accumulation of age pigments in whole starfish and regenerating arms of damaged starfish.

METHODOLOGY

Captive starfish will be repeatedly sampled over long time intervals. Field starfish will be sampled and marked, and then recaptured and sampled over long time intervals. "Giant" individuals and small juvenile individuals obtained from the field will also be sampled.

STATUS

There are promising early results for age pigment analysis, internal growth lines in skeletal elements and the use of tetracycline as means of assessing age in *Acanthaster planci*.

CO-ORDINATION WITH OTHER PROJECTS

There is close collaboration with the crown-of-thorns starfish research at the Australian Institute of Marine Science and some sharing of ship-time.

GEOGRAPHIC REGION: R
SHIP TIME REQUIREMENTS: 12 days
MAJOR DESCRIPTORS: Crown of thorns starfish/Age determination/Growth/
TAXONOMIC TERMS: Acanthaster planci

[JAMESC125]

112** Biology and ecology of scleractinian coral reproduction.

March 1986 - December 1988

ORGANIZATION:
James Cook University of North Queensland,
Department of Marine Biology
Townsville, Qld 4811

PROJECT LEADERS:
Dr R. Babcock (077) 814823
Ms B. Willis
Mr P. Harrison

CONTACT OFFICER:
Ms B. Willis

EXPENDITURE:
$132,900 (this year), $132,900 (all years)

MANPOWER:
3.50 (this year), 3.50 (all years)

EXTERNAL SUPPORT:
MSTGS - $110,000
GBRMPA - $22,900

OBJECTIVES

1. To determine the synchrony and geographic extent of mass spawning by coral.2.
To define spatial and temporal patterns of dispersal for coral larvae.
3. To document fertilization events and embryological development of coral eggs.
4. To determine post-settlement factors affecting juvenile growth and mortality.
5. To document gametogenic cycles and sexual characteristics of corals.
6. To investigate the mechanisms by which the precise annual synchronization of spawning is achieved.
7. To assess the effect of the mass spawning event on the genotypic structure of local populations.

METHODOLOGY

Dissections and histological sections of corals collected at regular intervals, throughout the year (more intensively during the period of mass spawning) are used to look at gametogenic development of corals and the synchronization of spawning. Plankton sampling and aerial surveys are used to document patterns of larval dispersal. Field and laboratory manipulative experiments are involved in the study of larval behaviour, juvenile growth and survival and proximate cues influencing spawning. Other techniques include electron microscopy and electrophoresis.

STATUS

Samples from a wide range of coral species have been collected from three sites over a one year period and are currently being processed for analysis of gametogenic development. A large-scale plankton sampling and tracking programme designed to monitor the dispersal of coral embryos and larvae following mass spawning was completed in November 1986. Plankton samples are currently being processed for quantitative analysis of larval distribution and dispersal patterns within and between reefs. Detailed studies of larval development, behaviour and settlement have been done.

CO-ORDINATION WITH OTHER PROJECTS

Research on the dispersal of coral larvae has been undertaken in collaboration with physical oceanographers from the Australian Institute of Marine Science.

GEOGRAPHIC REGIONS: R,J,I,W
SHIP TIME REQUIREMENTS: 26 days
MAJOR DESCRIPTORS: Coral/Reproductive cycle/Spawning/

[JAMESC084]

113* The biology, ecological role, and fishery potential of sharks in the coastal waters of North Queensland.

March 1987 - March 1991

ORGANIZATION:
James Cook University of North Queensland,
Department of Zoology
Townsville, Qld 4811

PROJECT LEADERS:
Mr C. Simpfendorfer (077) 814252
Assoc Prof N.E. Milward (077) 814193

CONTACT OFFICER:
Mr C. Simpfendorfer (077) 814252

EXPENDITURE:
$1,500 (this year), $1,500 (all years)

MANPOWER:
0.50 (this year), 0.50 (all years)

OBJECTIVES

To study the biology and ecology of the 'smaller' species of sharks occurring in North Queensland, as relevant to their role in the fish communities of coastal environments and to their commercial potential. In particular the project is paying attention to:
1. the spatial and temporal occurrence and abundance of in-shore and inner-shelf species of sharks
2. the feeding, growth, and reproduction of these species, and
3. the importance of shallow near-shore waters as nursery and growth areas for juveniles.

METHODOLOGY

Sampling is being carried out within a workable distance of Townsville, primarily utilising the University's small boats and involving regular sets of 10 and 15 cm mesh gill-nets over a series of sites in Cleveland Bay and off Magnetic Island. Additionally set-line fishing is being used to encompass all inshore habitats and to adequately sample the full size range of sharks occurring in them.
Collected material is being processed to provide data on growth and age, feeding and reproduction.

STATUS

Preliminary work to date has revealed the presence of eighteen species of carcharhinid, hemigaleid, and sphyrnid sharks in near-shore waters off Townsville.
The project is in the early data acquisition phase, with a number of sampling problems still to be overcome.

CO-ORDINATION WITH OTHER PROJECTS

The project is being coordinated with other research on fish and crustaceans in North Queensland waters, especially in relation to predation of sharks on prawns and the re-cycling of 'trash-fish' taken in prawn trawling operations.

GEOGRAPHIC REGION: R
SHIP TIME REQUIREMENTS: 48 days (small boat)
MAJOR DESCRIPTORS: Shark fisheries/Life history/Ecology/Commercial availability/Nursery grounds/

[JAMESC113]

114** Studies on diseases of the crown of thorns starfish (*Acanthaster planci*).

January 1986 - January 1989

ORGANIZATION:
James Cook University of North Queensland,
Graduate School of Tropical Veterinary Science
Townsville, Qld 4811

PROJECT LEADER:
Dr J.S. Glazebrook (077) 814632

EXPENDITURE:
$50,000 (this year), $50,000 (all years)

MANPOWER:
2.00 (this year), 2.00 (all years)

EXTERNAL SUPPORT:
COTSAC
MSTGS

OBJECTIVES

1. To carry out a field survey on diseases of crown of thorns (collected on J. Brewer's, Grubb, Helix, Keeper and Wheeler Reefs) and to identify possible pathogens.
2. To isolate any identified pathogen(s) and use to infect a crown of thorns cell or tissue culture. If successful, crown of thorns will be experimentally infected.

METHODOLOGY

Light and electron microscopy techniques are used for histopathology.

STATUS

Histological techniques with the light microscope revealed as yet unidentified possible pathogens.

LOCALITIES: John Brewer Reef; Grub Reef; Helix Reef; Keeper Reef; Wheeler Reef

GEOGRAPHIC REGION: R

SHIP TIME REQUIREMENTS: 18 days

MAJOR DESCRIPTORS: Pathogens/Histopathology/Predator control/Biological control/Crown of thorns starfish/

TAXONOMIC TERMS: Acanthaster planci

[JAMESC106]

115* The development of prawn cell lines for quarantine and determining the virological status of native prawn species.

ORGANIZATION:
James Cook University of North Queensland, Graduate School of Tropical Veterinary Science
Townsville, Qld 4811

PROJECT LEADERS:
Dr J.R. Smith (077) 814378
Dr L. Owens (077) 814632
Dr J.S. Glazebrook (077) 814632

CONTACT OFFICER:
Dr J.R. Smith

EXTERNAL SUPPORT:
MSTGS - $35,000

OBJECTIVES

To develop prawn cell lines and media to support them; existing media may be modified to support growth of cells.
To test cell lines for their susceptibility to exotic viruses.
Prawn cell lines will be used to screen and identify prawn stock for endemic and exotic prawn viruses.

METHODOLOGY

Live prawns will be sacrificed and tissues removed asceptically for explanation and/or trypsinisation. Different media will be tried including those used for mammalian cell lines and TL15. *Penaeus monodon* (leader prawn), *P. esculentus* (brown tiger) and *P. merguiensis* (banana) have been chosen for the initial attempts at cell culture. Promising leads will be followed up until 50 passages have been achieved. Viruses may be detected in the early stages of cell culture by the presence of a cytopathic effect. Parvo-like viral inclusions have already been found in a local population of prawns and prawn species will be tested in the United States for their susceptibility to four prawn viruses.

STATUS

Preliminary trials with heart tissue from *P. monodon* and *P. esculentus* have resulted in primary cultures being established. The heart is the organ most easily removed asceptically and the initial outgrowths are a mixture of fibroblasts and pavement epithelium. Explants have been more successful than trypsinisation. Two culture media (M199 and TL15) have been shown to support these cells.
A study of heavy metal toxicity in prawns revealed parvo-like viral inclusion bodies in *P. merguiensis* from a local creek. This will be the first virus tested.

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Crustaceans/Cell culture/Viral diseases/Quarantine regulations/

TAXONOMIC TERMS: Penaeus monodon; Penaeus esculentus; Penaeus merguiensis

[JAMESC114]

116* Brooding corals of the Great Barrier Reef: production of planulae, dispersal and their effects on population structure.

July 1984 - December 1988

ORGANIZATION:
James Cook University of North Queensland,
School of Biological Sciences
Townsville, Qld 4811

PROJECT LEADER:
Ms J.M. Resing (077) 814252

EXPENDITURE:
$3,150 (this year), $43,000 (all years)

MANPOWER:
6.00 (this year), 22.00 (all years)

EXTERNAL SUPPORT:
GBRMPA - $1,900
AIMS - $200 (plus facilities)
Duke University - $3,000 (US dollars, plus facilities)
American Museum - $1,000 (US dollars)
Sigma Xi - $700 (US dollars)
Rotary International - $12,000 (US dollars)
QANTAS - $2,000 (US dollars)
Earthwatch - $20,000 (US dollars)
CSIRO Christian Fellowship (Travel and 3 months laboratory support)

OBJECTIVES

1. To determine whether the corals which brood planulae on the GBR produce them sexually or asexually.
2. *In situ* observations of planulation and settlement to determine actual dispersal distances for the brooding coral *Acropora palifera* .
3. *In situ* observations of sperm release for *A. palifera* to determine a fertilization radius.
4. Population genetics to look at relatedness of adults in patches within the settlement/fertilization radius versus between patches.
5. Construction of a life history computer model using the above data.

METHODOLOGY

1. Starch gel electrophoresis will be used to:
(a) determine whether origin of planulae is asexual or sexual,
(b) examine adult population structures.
2. Around the clock diving during periods of known testis and planulae maturation to make *in situ* observations of dispersal.

STATUS

Two publications have resulted thus far: (i) J. Mar biol 90:187-190. (ii) Proc Fifth Int'l Coral Reef Symp, Tahiti 6: 75-81. One manuscript is being prepared on the reproductive biology, local population structures, and status of planula production in the Dendrophyllidae. The remainder of the work is currently in raw data form. It is anticipated that data collection will end in December 1987; Ph.D thesis production scheduled for end of 1988.

GEOGRAPHIC REGION: R
MAJOR DESCRIPTORS: Coral/Population structure/Reproduction/Biological fertilization/Coral reefs/
TAXONOMIC TERMS: Acropora palifera

[JAMESC085]

117* **Tropical marine microbiology studies.**

January 1985 - January 1988

ORGANIZATION:
James Cook University of North Queensland, Sir George Fisher Centre for Tropical Marine Studies
Townsville, Qld 4811

PROJECT LEADERS:
Dr J.L. Reichelt (075) 375499
Dr D.C. Sutton (077) 814910

CONTACT OFFICER:
Dr D.C. Sutton

EXPENDITURE:
$68,000 (this year), $104,000 (all years)

MANPOWER:
1.50 (this year), 4.00 (all years)

EXTERNAL SUPPORT:
Seafarm Pty Ltd - $12,000 (prawn project)
MSTGS - $113,500 (Starfish and water quality projects)
COTSAC - $38,737

OBJECTIVES

1. Marine microbial interactions with crown-of-thorns starfish.
To determine what interactions (commensalism, parasitism, symbiotics) occur between *Acanthaster planci* and marine bacteria, and to determine how marine bacteria contribute to the health of the starfish.
2. Factors affecting larval survival in a prawn hatchery.
To determine what physical, chemical and microbiological factors contribute to survival of prawn larvae under mariculture conditions.
3. Ecology of marine vibrios.
To determine the occurrence, distribution, and effect of seasonal influences on marine bacteria belonging to the genus *Vibrio* . Importance is placed on human and mariculture pathogens.
4. Water quality control by biological filtration in marine systems.
To assess the performance of various types of biological filtration systems on water quality and disease control in seawater systems.

METHODOLOGY

Specific methods for isolation, purification and identification of marine microorganisms have been developed and are available.
Marine micro-organisms are deposited for reference in the Australian Collection of Marine Micro organisms at the Sir George Fisher Centre.
Diagnostic tests for marine *Vibrios* have also been established.
Water quality parameters are determined using standard techniques.

STATUS

Projects related to crown-of-thorns and prawn larvae are well developed; the remainder are still in their infancy. The data for both projects are in raw form and on floppy disc to varying degrees; available in part on request, preferably post-publication.

Completed Project - This project will remain in the computerized Register for another 5 years but will not be included in future issues of the Compendium.

GEOGRAPHIC REGION: R

SHIP TIME REQUIREMENTS: 21 days

MAJOR DESCRIPTORS: Marine organisms/Microbiology/Interspecific relationships/Water quality/ Biofilters/Prawn culture/Larval development/

TAXONOMIC TERMS: Acanthaster planci; Vibrio

[JAMESC090]

118** **Biogeography and evolution of the genus *Craterocephalus* (Pisces).**
January 1987 - January 1989

ORGANIZATION:
Macquarie University, School of Biological Sciences
North Ryde, NSW 2109

PROJECT LEADER:
Dr W. Ivantsoff (02) 8058167

EXPENDITURE:
$14,846 (this year), $21,000 (all years)

MANPOWER:
1.30 (this year), 2.60 (all years)

EXTERNAL SUPPORT:
ARGS - $12,700

OBJECTIVES

1. To identify and describe all of the Australian species of the genus *Craterocephalus* .
2. To assess the systematic relationships between these species using three different techniques.
3. To use these relationships and knowledge of the species distribution to further the understanding of speciation in the context of palaeoclimate and geologic history of Australia.

METHODOLOGY

1. The fish will be collected, deep frozen and used in electrophoretic studies.
2. Some fish will be examined osteologically and with the use of conventional taxonomic procedures of studying meristic and morphometric variability.
3. The study of literature should provide information about the climate, geology and distribution of other biota through time and space.

STATUS

The work is part of the general ongoing study by the project leader of the fish family Atherinidae which has a world wide distribution.
Much of the data had already been collected as part of a Ph.D. dissertation by the project leader. None of the electrophoretic work has been done at this stage. Some of the areas indicated are yet to be surveyed.

GEOGRAPHIC REGIONS: N,Q,R,J,C,Y,E,W
MAJOR DESCRIPTORS: Fish/Biogeography/Taxonomy/Biological speciation/
TAXONOMIC TERMS: Craterocephalus; Atherinidae

[MACQUA014]

119 Times of evolutionary divergence of species and subspecies of the Indo West-Pacific fish family Siganidae.

February 1984 -

ORGANIZATIONS:
University of New England
Department of Zoology and Division of Ecology,
Armidale, N.S.W. 2351
CSIRO
Division of Fisheries Research,
Marine Laboratory,
P.O. Box 120,
Cleveland, Qld. 4163

PROJECT LEADER:
Dr D.J. Woodland (067) 732791

EXPENDITURE:
$1,100 (this year), $6,000 (all years)

MANPOWER:
0.10 (this year), 0.40 (all years)

OBJECTIVE

To place the evolutionary history of the Siganidae within a time frame so that their distributions can be interpreted in the light of their biology, present conditions (e.g. currents) and the history (e.g. plate tectonics) of the Indo-Pacific. The initial study will investigate whether quaternary events may have been responsible for the evolution of a number of parapatric pairs of geminate species in the Indo-Malayan area.

METHODOLOGY

Collecting specimens in key localities. Electrophoretic analyses of proteins of tissues.

STATUS

Deep frozen tissue samples from five of the eight species collected in Malaysian waters in storage, pending collection of remaining species in North Australian waters and Philippines.

GEOGRAPHIC REGIONS: P,I,R,Y

MAJOR DESCRIPTORS: Evolution/Quaternary/Biogeography/Species diversity/Fish/
TAXONOMIC TERMS: Siganidae

[UNIARM007]

120 Genetic improvement of the Sydney Rock Oyster.

July 1985 - December 1989

ORGANIZATION:
University of New South Wales, School of Biological Science
Kensington, NSW 2033

PROJECT LEADERS:
Dr P.I. Dixon (02) 6972112
Dr R.H. Crozier (02) 6972119
Mr R.A. Griffiths (02) 6972112

CONTACT OFFICER:
Dr P.I. Dixon

EXPENDITURE:
$27,267 (this year), $49,767 (all years)

MANPOWER:
1.20 (this year), 1.20 (all years)

EXTERNAL SUPPORT:
FIRTA - $76,938

OBJECTIVES

The project is aimed at improving the Sydney rock oyster. Two possible methods of improvement will be investigated.:-
1. Induction triploidy in the oysters. This method has produced increased growth rates in the American oyster (*Crassostrea virginica*).
2. Crossbreeding with *Saccostrea* sp. from Western Australia.

METHODOLOGY

1. Triploidy will be induced chemically by Cytochalasin B. Growth rates will be monitored. Heterozygosity will be estimated by means of (by electrophoresis) isozyme genetics.
2. Karyotypes will be determined for the Sydney rock oyster and the closely related WA species. Banding techniques may be used. Attempts will then be made to cross breed these oysters and growth and heterozygosity will be monitored as above.

STATUS

Triploidy induced data collection in progress.

CO-ORDINATION WITH OTHER PROJECTS

Where appropriate we will co-ordinate our work with that being carried out on oyster improvement by the NSW Fisheries Institute (Dept. of Agriculture).

GEOGRAPHIC REGIONS: N,R,W
MAJOR DESCRIPTORS: Oyster culture/Selective breeding/Hybrid culture/
TAXONOMIC TERMS: Crassostrea virginica; Saccostrea

[UNINSW046]

121* Chemistry and biochemistry of the Ascidiacea.

January 1987 - December 1989

ORGANIZATION:
University of Queensland, Department of Chemistry
St Lucia, Qld 4067

PROJECT LEADER:
Prof C.J. Hawkins (07) 3772384

EXPENDITURE:
$130,000 (this year)

MANPOWER:
8.00 (this year)

EXTERNAL SUPPORT:
ARGS - $85,110
Queensland Cancer Fund - $22,720

OBJECTIVES

To isolate the vanadium and iron protein and non-protein complexes from the plasma and blood cells of selected species of ascidian from the three sub-orders, Aplousobranchia, Phlebobranchia and Stolidobranchia, and to determine the structures and properties of these compounds.
To clone the DOPA-protein, ferreascidin, isolated from *Pyura stolonifera*, and to investigate commercial

applications of this protein.
To isolate cytotoxic compounds from didemnid ascidians, to determine their structures and their biological activities.

METHODOLOGY
Organisms will be collected from Heron and Wistari Reefs and from the Noosa area. Extraction and purification techniques are standard except that the DOPA-proteins are isolated via phenylboronate affinity chromatrography. Structure determination is based mainly on ^{1}H and ^{13}C NMR (including 2D), ESR, Mossbauer, and mass spectroscopy, and wherever possible, X-ray diffraction. Standard gene cloning techniques are being employed. The cytotoxicity testing will initially be by cell survival using various normal and cancer cell lines, and subsequently by in vivo testing against tumours implanted intraperitoneally in mice.

STATUS
The coordination of vanadium in the Ascidiacea has been found using ESR to be generally consistent throughout each of the sub-orders, Aplousobranchia and Phlebobranchia, but the two sub-orders differ in the coordination at one or perhaps two sites around the octahedron. The common sites are occupied by an oxo group, two phenolate (perhaps a catecholate) and a nitrogen (or perhaps two nitrogens). The major vanadium compound from *Leptoclinides lissus* has been isolated and its structure is being investigated. The major iron binding protein, ferrascidin, from *Pyura stolonifera* has been isolated and characterized. The iron coordination has also been investigated. Other iron-binding proteins have been isolated and are under investigation. A number of series of cyclic peptides have been isolated from didemnid ascidians with high biological activity, but of greatest interest has been a series of diene compounds of extreme activity and promising selectivity towards cancer cell lines.

GEOGRAPHIC REGIONS: R,Q
MAJOR DESCRIPTORS: Blood/Proteins/Biological properties/Biochemical analysis/Ascidians/
TAXONOMIC TERMS: Ascidiacea; Leproclinides lissus; Pyura stolonifera

[UNIQLD099]

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122 Monogenean parasites of marine fishes.

February 1987 - December 1989

ORGANIZATION:
University of Queensland, Department of Parasitology
St Lucia, Qld 4067

PROJECT LEADER:
Dr I.D. Whittington (07) 3773302; (07) 8780757

EXTERNAL SUPPORT:
ARGS - $21,420 (1988)
ARC - $24,162 (1989)

OBJECTIVES
1. To rear the eggs of selected Monogenean parasites (particularly Monocotylids) and to determine possible stimulatory factors which promote egg hatching.
2. To study the anatomy, morphology and behaviour of the free- swimming larvae.
3. To determine the mode and site of invasion of the larvae on their host fishes.
4. Taxonomy of adult monogeneans from elasmobranchs.

METHODOLOGY
To rear eggs in the laboratory and study the larvae with phase contrast light microscopy. Most experiments will be conducted at the University of Queensland's veterinary farm at Pinjarra Hills. Morphological studies using light and scanning microscopes.

GEOGRAPHIC REGIONS: Q,R
MAJOR DESCRIPTORS: Parasites/Fish/Life history/
TAXONOMIC TERMS: Monogenea

[UNIQLD094]

123* Biology of holoplanktonic molluscs of Australian waters.

August 1985 - June 1989

ORGANIZATION:
University of Queensland, Department of Zoology
St Lucia, Qld 4067

PROJECT LEADERS:
Dr J.G. Greenwood (07) 3772491
Dr R. Willan

CONTACT OFFICER:
Ms L.J. Newman (07) 3772475

EXPENDITURE:
$700 (this year), $3,000 (all years)

MANPOWER:
0.50 (this year), 3.00 (all years)

EXTERNAL SUPPORT:
Hawaiian Malacological Society
Australian Museum

OBJECTIVES

To document the holoplanktonic molluscan fauna of Australia.
To study the biology of pteropods and heteropods from waters of the Great Barrier Reef. Emphases are on taxonomy and phylogeny, reproductive and feeding biology. Their contributions to reef ecology will be considered.

METHODOLOGY

Nets of 200, 500 and 1000 μm mesh are used to capture various life-stages and species. Predator-prey interactions will be studied *in situ* and in aquaria at Heron and Lizard Islands research stations. Taxonomic studies will utilize SEM, and photomicroscopy of 'fresh' specimens.

STATUS

The distribution of pteroped molluscs from waters around most of Australia and New Guinea was examined in a previous study and formed the basis for a report to the Australian Biology Resources study program (Greenwood and Newman, 1985). Sampling around Heron Island and Lizard Island will be completed in June. Sample analyses are largely completed; taxonomic papers have been published.

LOCALITIES: Heron Island; Lizard Island
GEOGRAPHIC REGIONS: R,Z,N,E,C,Y,J
MAJOR DESCRIPTORS: Molluscs/Holoplankton/Taxonomy/Phylogeny/Ecology/Reproduction/
TAXONOMIC TERMS: Mollusca

[UNIQLD085]

124* Field studies on aspects of the ecology of *Acanthaster planci*.

January 1986 -

ORGANIZATION:
University of Queensland, Department of Zoology
St Lucia, Qld 4067

PROJECT LEADERS:
Assoc Prof R. Endean (07) 3772482
Dr A.M. Cameron (07) 3772506

CONTACT OFFICER:
Assoc Prof R. Endean

EXPENDITURE:
$37,500 (all years)

MANPOWER:
1.25 (all years)

EXTERNAL SUPPORT:
COTSAC (AIMS) ($37,500)

OBJECTIVES

1. To study feeding preferences of adult and juvenile *A. planci*.
2. To study population densities of *A. planci* in residual populations on "Acanthasterized" reefs.
3. To determine the extent to which persistent coral species have been affected by *A. planci* outbreaks.
4. To assess the extent to which the basic structure of coral communities has been affected by the *A. planci* outbreaks on selected reefs.
5. To study the age structure of massive corals on selected reefs.
6. To study the roles of iniquilines in protecting corals from attack by *A. planci*.
7. To study patterns of colonization of damaged parts of massive corals by other organisms.

METHODOLOGY

A. planci will be observed over extended periods on a number of reefs to establish its feeding preferences. Appropriate censusing techniques will be used to determine population densities of the starfish. Line and m^2 grid transects will be used in conjunction with photographic recording to establish sizes and population densities of each species of massive coral selected for intensive study. Age structure of massive corals will be determined from size data and by coring. Repetition of transect work will enable fate of regions of massive corals protected by iniquilines to be followed and will enable patterns of colonization of damaged parts of massive corals to be determined.

STATUS

Data on most aspects of the study have been obtained. Data from repeat visits are being obtained.

CO-ORDINATION WITH OTHER PROJECTS

This project is part of a program coordinated by the Crown of Thorns Starfish Advisory Committee (COTSAC).

GEOGRAPHIC REGION: R

SHIP TIME REQUIREMENTS: 40 days

MAJOR DESCRIPTORS: Crown of thorns starfish/Population number/Coral/Biological damage/Aging/Feeding behaviour/Colonization/

TAXONOMIC TERMS: Acanthaster planci

[UNIQLD119]

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125 Taxonomy and ecology of mysids.

- January 1988

ORGANIZATIONS:

University of Queensland, Department of Zoology
St Lucia, Qld 4067

University of Port Elizabeth, Institute of Coastal Biology
Port Elizabeth, South Africa

PROJECT LEADERS:

Dr J.G. Greenwood (07) 3772504
Dr T. Wooldridge
Dr J.G. Greenwood

CONTACT OFFICER:

Dr J.G. Greenwood

EXPENDITURE:

$4,000 (this year), $8,000 (all years)

OBJECTIVE

The study stems in part from related studies on estuarine plankton and demersal plankton of Great Barrier Reef waters. Mysid species are being determined in samples from Lizard and Heron Islands on the Great Barrier Reef, and from Moreton Bay and adjacent estuaries. Data form part of a larger bank on ecological distributions and behaviour of mysids in these habitats.

METHODOLOGY

Sampling with sledge nets, emergence and re-entry traps, and light traps (P. Dougherty/N. Preston).

STATUS

Some ecological work prepared for publication. Taxonomic works in preparation.

Completed Project - This project will remain in the computerized Register for another 5 years but will not be included in future issues of the Compendium.

CO-ORDINATION WITH OTHER PROJECTS

Coordinating with projects of Drs Dougherty and Preston (Griffith University) with light trap samples from Lizard Island and project by Dr Steele (University of Queensland, Department of Physics).

LOCALITIES: Heron Island; Lizard Island; Moreton Bay

GEOGRAPHIC REGIONS: Q,R

MAJOR DESCRIPTORS: Crustaceans/Taxonomy/Ecological distribution/Behaviour/

TAXONOMIC TERMS: Mysidacea

[UNIQLD114]

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126 Functional morphology and phylogeny of barnacles (Cirripedia).

January 1978 -

ORGANIZATION:
University of Sydney, School of Biological Sciences
Zoology Building A.08
Sydney, NSW 2006

PROJECT LEADER:
Prof D.T. Anderson (02) 6922438

EXPENDITURE:
$5,000 (this year), $18,500 (all years)

MANPOWER:
1.00 (this year), 10.00 (all years)

EXTERNAL SUPPORT:
ARGS - $3,800

OBJECTIVE
To elucidate the functional morphology of the barnacles of eastern Australia and its bearing on cirripede phylogeny. A major emphasis is placed on cirral activities and feeding mechanisms.

METHODOLOGY
Available species of lepadomorphs, chthamaloids, coronuloids and balanoids are being investigated using light microscopy, histology and scanning electron microscopy. Experimental investigations of cirral activity involving cine- and video recording are carried out under controlled conditions.

STATUS
In the present phase of this continuing investigation, attention is being given to the cirral activitites of coral-inhabiting barnacles (Pyrgomatidae).

GEOGRAPHIC REGIONS: N,Q,R,Y
MAJOR DESCRIPTORS: Crustaceans/Functional morphology/Phylogeny/Feeding/
TAXONOMIC TERMS: Pyrgomatidae; Cirripedia

[UNISYD013]

127 Reproductive biology of coral reef polychaetes.

September 1986 - December 1989

ORGANIZATION:
University of Sydney, School of Biological Sciences
Zoology Building A08
Sydney, NSW 2006

PROJECT LEADERS:
Prof D.T. Anderson (02) 6922438
Mr G. Rouse

CONTACT OFFICER:
Prof D.T. Anderson

EXPENDITURE:
$9,250 (this year), $17,800 (all years)

MANPOWER:
1.00 (this year), 2.00 (all years)

EXTERNAL SUPPORT:
Australian Government Postgraduate Studentship - $8,200

OBJECTIVE
To elucidate the reproductive strategies and fertilization biology of small reef-associated polychaetes of the families Sabellidae and Maldanidae.

METHODOLOGY
The reproductive biology, including sperm ultrastructure, fertilization and mode of oviposition, will be investigated in small reef polychaetes that brood their eggs (species of *Filograna* and *Micromaldane*) and compared with those of larger species with broadcast fertilization.

STATUS
Preliminary investigations at One Tree Reef, Capricorn Group, have revealed populations of polychaete species suitable for study. EM studies of fertilization biology and field studies of seasonal reproductive activity in several species are now proceeding.

CO-ORDINATION WITH OTHER PROJECTS
Project is coordinated with reef polychaete research of Dr P.A. Hutchings. Australian Museum, Sydney.

LOCALITIES: One Tree Island; Capricorn Group
GEOGRAPHIC REGION: R
MAJOR DESCRIPTORS: Reproduction/Polychaetes/Coral reefs/
TAXONOMIC TERMS: Sabellidae; Maldanidae; Filograna; Micromaldane

See also:

11 Sea noise in Australian waters.
64 Bioerosion of coral substrates, and mechanisms by which animals bore.
128** The systematics of the Haplosclerida and Nepheliospongida (Porifera: Demospongiae) of North-east Queensland waters.
137 Sensory systems of the shrimp *Acetes* in relation to behaviour.
145** Physiology and anatomy of sensory receptors and central nervous systems of crustaceans.
164* ACANTHASTER ECOLOGY, DEMOGRAPHY AND GENETICS: Population genetics of populations of crown-of-thorns starfish and corals.
165* ACANTHASTER ECOLOGY, DEMOGRAPHY AND GENETICS: Recovery and recolonisation of corals after outbreaks of crown-of-thorns starfish.
243 Plankton sampling with light-traps.
256 Effects of parasite infection on the population dynamics of a pomacentrid fish at Heron Island.
261 Population dynamics of parasites on reef fish.
275 Culture of giant clams (Tridacnidae) for food and restocking of tropical reefs.
283 Reef fish tagging in the Capricornia Section of the Great Barrier Reef Marine Park.
286* Studies on north Queensland fishes.
290 Induced breeding in barramundi, *Lates calcarifer* .
291 Pilot investigation into biology of threadfin salmon (family Polynemidae).

128** The systematics of the Haplosclerida and Nepheliospongida (Porifera: Demospongiae) of North-east Queensland waters.

March 1986 - March 1989

ORGANIZATION:

James Cook University of North Queensland,
Sir George Fisher Centre for Tropical Marine Studies
Townsville, Qld 4811

PROJECT LEADERS:

Ms P.J. Fromont (077) 814435
A/Prof C. Alexander (077) 814282
Dr P.T. Murphy (077) 814910

CONTACT OFFICER:

Ms P.J. Fromont

MANPOWER:

1.00 (this year), 3.00 (all years)

EXTERNAL SUPPORT:

Commonwealth Postgraduate Awards Scheme

OBJECTIVES

A multidisciplinary approach to the systematics of two orders of marine sponges.
Establish the species of these groups occurring on the Great Barrier Reef, incorporating habitat description and geographic ranges.
Establish reproductive strategies of genera/species.
Application of chemotaxonomy to classification, and comparison with classical taxonomic characters.

METHODOLOGY

Field programme; collection and observation mainly using Scuba.
Standard histological and microscopic techniques.
Fourier transform IR (University of Hawaii); GC-MS (Stanford University); electrophoresis of enzymes.

STATUS

Initial establishment of sampling sites and survey work has been completed. Classical taxonomy underway, as are chemotaxonomic approaches.
Raw data and interim reports are available through project leader.

GEOGRAPHIC REGION: R
SHIP TIME REQUIREMENTS: 20 days
MAJOR DESCRIPTORS: Taxonomy/Sponges/Chemotaxonomy/Reproduction/Check lists/
TAXONOMIC TERMS: Haplosclerida; Nepheliospongida

[JAMESC101]

129 Systematics of ophiotrichid ophiuroids (Echinodermata).

January 1986 - December 1989

ORGANIZATIONS:

Northern Territory University
GPO Box 1341
Darwin, NT 0801

Northern Territory Museum of Arts and Sciences
GPO Box 4646
Darwin, NT 0801

PROJECT LEADER:

Ms A.K. Hoggett (089) 824255

EXPENDITURE:

$11,300 (this year), $51,806 (all years)

MANPOWER:

1.00 (this year), 2.50 (all years)

EXTERNAL SUPPORT:

Australian Museum - $500 (88/89)
Macquarie University - $200
Smithsonian Institution
Harvard University

OBJECTIVES

1. To produce a full systematic account of the ophiotrichid ophiuroid genus *Macrophiothrix* .
2. To reappraise the systematics of the family Ophiotrichidae on a world-wide scale, using electrophoretic data to clarify relationships.

METHODOLOGY

Specimens housed in museum collections throughout Australia and in the USA, as well as ones currently being collected from northern Australian waters, are being subjected to classical taxonomic examination. Diagnoses, illustrations and a key to all known *Macrophiothrix* species from Australian waters will be

produced, with comments on their distribution and ecology.
Freshly collected ophiotrichid material from the north Australian coast, Ashmore Reef and the Great Barrier Reef will be subjected to electrophoretic analysis. These data, combined with results of detailed taxonomic research on the Australian fauna, will be used as the basis for systematic reappraisal of the Ophiotrichidae.

STATUS

All major collections held in Australia have been examined, as well as those of the United States National Museum (Smithsonian Institution) and the Museum of Comparative Zoology (Harvard University). Morphological data are available for the ophiotrichid specimens in these collections in the form of a card file; data for *Macrophiothrix* specimens are on a computer spreadsheet. A paper concerning the species of *Macrophiothrix* in Australian waters has been submitted for publication. Electrophoretic analysis is in progress.

LOCALITY: Ashmore Reef
GEOGRAPHIC REGIONS: A,R
MAJOR DESCRIPTORS: Echinoderms/Taxonomy/Check lists/Museum collections/
TAXONOMIC TERMS: Ophiotrichidae; Macrophiothrix

[UCNT—002]

130* Ostracoda and environment - northern Australia, Indopacific.

ORGANIZATION:
Riverina-Murray Institute of Higher Education,
School of Applied Science
PO Box 588
Wagga Wagga, NSW 2650

PROJECT LEADER:
Dr K.G. McKenzie (069) 232550

CONTACT OFFICER:
Mr D.J. Kelso (069) 232224

EXPENDITURE:
$11,166 (all years)

MANPOWER:
0.84 (all years)

EXTERNAL SUPPORT:
ARGS (Accommodation was provided at Bandung for 10 days during July 1980.)

OBJECTIVE

To identify Cenozoic (Tertiary-Recent) ostracodes of the region, determine their environmental associations, and place type collections in Australian repositories.

METHODOLOGY

Collection of samples, determination of associated ecological factors.
Picking of ostracoda and sorting onto microslides.
Scanning electron microscopy.
Description of species, designation of types.
Publication.

STATUS

Sahul Shelf - all material picked and mounted in microslides (78 samples); ecological factors known; species identified; analysed numerically, types selected. 3 publications.
Arafura Sea - all material picked and mounted; ecological factors known; species identified, analysed numerically. 1 publication.
CSIRO IIOE planktic material - all material prepared; species identified; analysed numerically; species identified. 1 publication.
Torres Strait. 1 publication (joint, with A.J. Keij).
Darwin - paper in preparation.
Indonesia - 1 publication (joint with Sudijono).
Lizard Island - samples collected; ostracodes picked; stored in alcohol.
SOPAC Cruises - about 60 samples picked. Report forwarded to SOPAC, published as Technical Report. 1 publication.

GEOGRAPHIC REGIONS: E,Y,C,J,R
MAJOR DESCRIPTORS: Crustaceans/Taxonomy/Environmental factors/Ecological associations/
TAXONOMIC TERMS: Ostracoda

[RCAE—001]

131 **Biology and taxonomy of *Didymozoidae* (Digenea) in Queensland fishes.**

January 1989 -

ORGANIZATION:
University of Queensland, Department of Parasitology
Brisbane, Qld 4067

PROJECT LEADER:
Dr T. Cribb (07) 8780749

STATUS
University of Queensland Postdoctoral fellow for 1989.

GEOGRAPHIC REGIONS: Q,R
MAJOR DESCRIPTORS: Fish/Parasites/Taxonomy/Biological data/
TAXONOMIC TERMS: Didymozoidae

[UNIQLD123]

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132 **Phylogeny and systematics of phyllidiid nudibranchs.**

March 1987 - December 1990

ORGANIZATION:
University of Queensland, Department of Zoology
St Lucia, Qld 4067

PROJECT LEADER:
Dr R. Willan (07) 3772510

CONTACT OFFICER:
Mr D.F. Brunkhorst (07) 3772491

EXPENDITURE:
$2,800 (this year)

EXTERNAL SUPPORT:
Hawaiian Malacological Society - $1,100
First Military District Sergeant's Club Scholarship - $500
The Australian Museum (Keith Sutherland Award) - $400

OBJECTIVES
1. Establishment of criteria to delineate species.
2. Matching of existing names to specimens in collections.
3. Description of generic characters.
4. Description of new species.
5. Investigate relationships of phyllidiids to other dorid nudibranchs.

METHODOLOGY
1. Collection and ecological observations of phyllidiid nudibranchs. 2. Photography of living specimens. 3. Dissections and detailed anatomical examination of preserved specimens. 4. Examination of some characters using scanning microscopy. 5. Investigations of colour/pattern change with growth. 6. Investigations of individual variation within a species.

STATUS
Collections and anatomical investigations continuing. A number of new Indo-Pacific species have been collected and are undergoing closer internal examinations. Collecting trips to Papua New Guinea and Guam undertaken during 1988.

GEOGRAPHIC REGIONS: R,Z,P,I
MAJOR DESCRIPTORS: Molluscs/Phylogeny/Taxonomy/New species/Interspecific relationships/
TAXONOMIC TERMS: Phyllidiidae; Nudibranchia; Opisthobranchia

[UNIQLD100]

133* **Taxonomy and ecology of benthic invertebrates from Heron Island, Queensland.**

November 1980 -

ORGANIZATION:
University of Queensland, Department of Zoology
St Lucia, Qld 4067

PROJECT LEADER:
Dr T.S. Hailstone (07) 3772508

EXPENDITURE:
$11,724 (this year), $55,562 (all years)

MANPOWER:
0.40 (this year), 1.80 (all years)

EXTERNAL SUPPORT:
AMSTAC-FAP - $55,562

OBJECTIVES

To publish field-guide handbooks which will enable research workers and others to identify species in selected groups of marine benthic invertebrates known to occur in the vicinity of Heron Island (especially opisthobranch and prosobranch gastropods, holothurians, and isopods).
To summarize collected information concerning habitats, habits, resource utilization, and breeding activities of species covered by these handbooks.
To collate relevant information which is scattered throughout the literature.
These handbooks should provide: bases upon which more extensive ecological studies can be planned for this area; information essential to assessment of possible undescribed species; and information that has bearing on marine park management procedures.

METHODOLOGY

Workers with expertise in each selected invertebrate group are accumulating reference collections and relevant field observations. Species are identified and the current state of their taxonomy is being established. Information extracted from literature records and existing museum collections is incorporated. Each selected group is to be treated in a handbook which provides a checklist of known species, a guide to the identification of species, and illustrations, diagnoses, and summarized information for as many of the known species as possible.

STATUS

An opisthobranch handbook has been published (R.C. willan and N. Coleman (1984) - "Nudibranchs of Australasia"). A holothurian handbook has been published (L.R.G. Cannon and H. Silver (1987) - "Sea cucumbers of northern Australia"). Prosobranch (T.S. Hailstone) and isopod (N. Bruce) information is being assembled into manuscripts. Other benthic invertebrate groups will be considered after the present handbooks are completed.

LOCALITY: Heron Island
GEOGRAPHIC REGION: R
MAJOR DESCRIPTORS: Invertebrates/Benthic environment/Taxonomy/Ecology/Handbooks/
TAXONOMIC TERMS: Holothuroidea; Opisthobranchia

[UNIQLD010]

134 The functional morphology of myodocopid ostracodes (Crustacea).

August 1983 - December 1988

ORGANIZATION:
University of Sydney, School of Biological Sciences
Zoology Building A08
Sydney, NSW 2006

PROJECT LEADERS:
Prof D.T. Anderson (02) 6922438
Ms S.J. Hall (02) 6922438

CONTACT OFFICER:
Prof D.T. Anderson

EXPENDITURE:
$8,600 (this year), $26,400 (all years)

MANPOWER:
1.00 (this year), 5.00 (all years)

EXTERNAL SUPPORT:
Australian Government Postgraduate Studentship - $24,600

OBJECTIVE

To investigate the taxonomy, seasonal occurrence and functional morphology (locomotion, feeding) of myodocopid ostracodes.

METHODOLOGY

Regular sampling and taxonomic analysis on a seasonal basis at sublittoral sites near Sydney: microscopy, laboratory culture. Activity analysis using cine and video techniques, combined with morphological and histological studies. Comparative studies at Lizard Island, North Queensland.

STATUS

Sampling programme in N.S.W. waters is complete. Several new species have been described. Functional morphological analysis of locomotion in relation to coarse and fine sand habitats is complete. Results are being compiled.

Completed Project - This project will remain in the computerized Register for another 5 years but will not be included in future issues of the Compendium.

GEOGRAPHIC REGIONS: N,R

MAJOR DESCRIPTORS: Crustaceans/Animal morphology/Taxonomy/Seasonal variations/

TAXONOMIC TERMS: Myodocopa

[UNISYD052]

135 Oysters of the Indo-West Pacific region (Bivalvia : Ostreidae and Gryphaeidae).

December 1975 -

ORGANIZATIONS:

Western Australian Museum
Department of Aquatic Invertebrates
Francis Street
Perth, WA 6000

University of New South Wales, Department of Zoology
Kensington, NSW 2033

PROJECT LEADERS:

Mrs S.M. Slack-Smith (09) 3284411
Dr P.I. Dixon

CONTACT OFFICER:

Mrs S.M. Slack-Smith

EXPENDITURE:

$1,200 (this year), $12,382 (all years)

EXTERNAL SUPPORT:

ABRS - $10,282 (Dr Dixon's grant from ABRS not included.)
West Australian Fisheries Department (Ship time, collecting, staff)
University of Hong Kong (Staff, transport, facilities)
Lembaga Oseanologi Nacional Jakarta, Indonesia (Staff, facilities Jakarta and Pulau Pari)
Philippines Bureau of Fisheries (Staff, transport)
N.T. Dept of Fisheries (Collecting, staff, transport.)
University of Papua New Guinea (Collecting, staff, transport, accomodation.)
James Cook University of North Queensland (Administrative assistance.)
AIMS (Collecting, staff, transport.)
NSW Dept of Agriculture (Divn of Fisheries) (Collecting, staff, transport, accommodation.)

OBJECTIVES

To elucidate the taxonomy of the oysters of the Indo-West Pacific region and determine the specific and generic relationships, both within this faunal group and between it and extra-limital taxa.
To determine the geographic and ecological ranges of each species, and to investigate the factors governing their distribution, abundance and growth forms.

METHODOLOGY

1. Collection of specimens and pertinent ecological data.
2. Anatomical dissection of specimens as they are collected, with electrophoretic analysis, particularly of the rock oysters (*Saccostrea* spp.).
3. Comparison with types and other specimens examined in or borrowed from other institutions.

STATUS

Twelve of the 14 currently recognised Australian oyster species have Indo-Pacific affinities. The remaining southern Australian species APPEAR to be endemic. Recent work has been concentrated on the three *Saccostrea* (rock oyster) species with anatomical and electrophoretic studies stressing

inter-population variation. All 14 species are being compared with more or less closely related taxa from the Indo-Pacific region or elsewhere to determine specific and supra-specific relationships.
To date, anatomical studies on most of the Australian species is at or near completion. Work will continue on the Australian species, on SE Asian endemic species and on type species of problematical genera from recently collected material, and from material from other institutions as it becomes available.

GEOGRAPHIC REGIONS: E,Y,C,J,R
MAJOR DESCRIPTORS: Molluscs/Taxonomy/Biogeography/Interspecific relationships/
TAXONOMIC TERMS: Ostreidae; Gryphaeidae; Saccostrea

[WAMUS–008]

See also:

82* Ostracoda : Banks Strait, South Pacific.
123* Biology of holoplanktonic molluscs of Australian waters.
126 Functional morphology and phylogeny of barnacles (Cirripedia).

136 Taxonomy and ecology of larval and adult fishes.

January 1979 -

ORGANIZATIONS:

Australian Museum
Ichthyology Department
P.O. Box A285
Sydney South, N.S.W. 2000

James Cook University of North Queensland
Townsville, Qld 4811

PROJECT LEADERS:

Dr J.M. Leis (02) 3398111 Ext 242
Prof J.H. Choat

CONTACT OFFICER:

Dr J.M. Leis

EXPENDITURE:

$52,200 (this year), $103,413 (all years)

MANPOWER:

1.50 (this year), 3.00 (all years)

EXTERNAL SUPPORT:

MSTGS - $42,300 (Shiptime, equipment)

OBJECTIVE

To study the taxonomy and ecology of larval fishes in the Great Barrier Reef and elsewhere.

METHODOLOGY

Ecological collections and taxonomical collections are made and studied.

STATUS

Research now concentrating on small-scale distribution in relation to hydrographic and topographic features. Distribution of reef fish is being examined in Lizard Island region of the Great Barrier Reef. Taxonomic research is being emphasized with studies of lutjanids (snappers) in progress. A guide to identification of larvae of 50 families of tropical, marine shorefishes is in progress.

CO-ORDINATION WITH OTHER PROJECTS

Co-operation with investigators at CSIRO, NSW Uni., Sydney Uni., and James Cook Uni., and A.I.M.S. on taxonomy and ecology of larval and adult fishes.

GEOGRAPHIC REGIONS: R,E,O
SHIP TIME REQUIREMENTS: 10 days
MAJOR DESCRIPTORS: Taxonomy/Ecology/Reef fish/Fish larvae/
TAXONOMIC TERMS: Lutjanidae

[AUSMUS008]

See also:

101 COASTAL PELAGIC RESOURCES: Taxonomy of baitfish.
118** Biogeography and evolution of the genus *Craterocephalus* (Pisces).

137 Sensory systems of the shrimp *Acetes* in relation to behaviour.

August 1974 -

ORGANIZATIONS:
Australian National University, Research School of Biological Sciences
Department of Neurobiology
PO Box 4
Canberra City, ACT 2601

Australian Institute of Marine Science
PMB No. 3
Townsville MC, Qld 4810

PROJECT LEADERS:
Dr E. Ball (062) 494496
Dr L.B. Quetin
Dr R. Ross-Quetin

CONTACT OFFICER:
Dr E. Ball

MANPOWER:
0.10 (this year), 4.60 (all years)

OBJECTIVE
To understand the sensory capabilities of the shrimp *Acetes* and the role that these capabilities play in limiting/determining the shrimp's behaviour.

METHODOLOGY
The project involves neuroanatomy, electrophysiology, and laboratory and field observations of behaviour.

STATUS
A paper on structure and function of the compound eyes of *Acetes* has been published (Phil Trans Royal Soc. London B 313:251-270(1986)). Several additional papers are in preparation on structure and ultrastructure of the statocyst and antennal setae. Data for several other papers on activity patterns and other aspects of natural history including mating, moulting and schooling has been collected.

GEOGRAPHIC REGIONS: R,Q,N
MAJOR DESCRIPTORS: Crustaceans/Neurophysiology/Behaviour/
TAXONOMIC TERMS: Acetes

[ANU—008]

138 The effects of fuel oil, oil emulsifier and lower salinity upon the common Indo-Pacific reef coral *Acropora formosa* .

May 1983 -

ORGANIZATIONS:
Great Barrier Reef Marine Park Authority
P.O. Box 1379
Townsville, Qld 4810

James Cook University of North Queensland,
Sir George Fisher Centre for Tropical Marine Studies
PO James Cook University, Qld 4811

PROJECT LEADERS:
Dr W. Craik (077) 818811
Mr P. Harrison (077) 814111

CONTACT OFFICER:
Ms C. Dalliston (077) 818811

EXPENDITURE:
$284 (this year), $2,500 (all years)

MANPOWER:
1.50 (all years)

OBJECTIVE
To determine the effects of oil emulsifier, oil plus emulsifier and lowered salinity on *Acropora formosa* .

METHODOLOGY
Healthy branches of *A. formosa* collected and coral conditions recorded by photography, and notes made on coral colouration, extension, mucus and zooxanthellae extrusion. Tissue samples are collected for histology, single radial polyps are collected and fixed for ultrastructural study on transmission electron-microscope. Branch tips will be collected and examined by scanning electron-microscope study of skeletal growth form.
Use coral *A. formosa* (Widespread and well-studied), Bunker C fuel (widely used in Great Barrier Reef Region), emulsifier BPA- B (currently recommended by Department of Transport), lowered salinity (typical of increased urbanization and industrialisation), in 4 treatments and control.

STATUS
Draft report submitted to GBRMPA.

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Coral/Pollution effects/Oil pollution/Salinity effects/
TAXONOMIC TERMS: Acropora formosa

[GBRMPA066]

139* Algal-invertebrate symbioses in tropical marine waters.

January 1977 -

ORGANIZATIONS:
James Cook University of North Queensland, Department of Botany
Townsville, Qld 4811

University College of the Northern Territory
GPO Box 1341
Darwin, NT 5794

PROJECT LEADERS:
Prof D.J. Griffiths (077) 814121
Dr T. Luong-Van (077) 814466

CONTACT OFFICER:
Prof D.J. Griffiths

EXTERNAL SUPPORT:
ARGS - $58,598 (1981-1987)

OBJECTIVE
A comparative study of different symbiotic systems involving unicellular algae and tropical marine invertebrates.

METHODOLOGY
Standard ultrastructural techniques.
Standard techniques for investigating photosynthetic characteristics.

GEOGRAPHIC REGION: R
MAJOR DESCRIPTORS: Algae/Invertebrates/Symbiosis/Tropical environment/

[JAMESC028]

140** Biochemical aspects of sponges of the Great Barrier Reef.

September 1984 -

ORGANIZATIONS:
James Cook University of North Queensland, Sir George Fisher Centre for Tropical Marine Studies
Townsville, Qld 4811

University of Wollongong, Department of Chemistry
PO Box 1144
Wollongong, NSW 2500

PROJECT LEADERS:
Dr J.T. Baker (077) 789221 (AIMS)
Dr P.T. Murphy (077) 814910
Dr M.J. Garson (042) 270516

CONTACT OFFICER:
Dr P.T. Murphy

EXPENDITURE:
$10,000 (this year), $50,000 (all years)

MANPOWER:
3.00 (this year), 9.00 (all years)

EXTERNAL SUPPORT:
Queen's Fellowship Scheme
AIMS
Stanford University

OBJECTIVES
1. To establish the biosynthetic pathways for the production of secondary metabolites and membrane components of sponges.
2. Environmental influences on production of secondary metabolites.
3. Chemotaxonomy of certain groups of Great Barrier Reef sponges using primary and secondary metabolites.

METHODOLOGY
Scuba in field studies.
Radioisotope incorporations in living sponges.
HPLC and liquid scintillation for quantitative analysis.
NMR, MS, UV, IR etc. for structure determination.
Centrifugal fractionation of cells and cell membrane components.

STATUS
Unusual pathways in sterol production have been established in collaboration with Professor C. Djerassi (Stanford Univ.).
Biosynthesis of tetracyclic isonitrile diterpenes established by Dr Garson.

Environmental influences on production of secondary metabolites in a sponge (in collaboration with Dr J.E. Thompson, previously of AIMS), in press.
Chemotaxonomy of a group of foliose dictyoceratid sponges (with Dr Thompson), manuscript in preparation.

GEOGRAPHIC REGION: R
SHIP TIME REQUIREMENTS: 20 days
MAJOR DESCRIPTORS: Invertebrate zoology/Chemotaxonomy/Metabolites/Biosynthesis/Sponges/
TAXONOMIC TERMS: Porifera

[JAMESC089]

141* **Studies on the rectal gland of the shovel-nosed ray *Rhinobatus armatus*.**

August 1985 - August 1991

ORGANIZATION:
La Trobe University, Department of Zoology
Bundoora, Vic 3083

PROJECT LEADER:
Dr A. Wright (03) 4792235

EXPENDITURE:
$5,000 (this year), $20,000 (all years)

MANPOWER:
0.50 (this year), 2.50 (all years)

OBJECTIVE
To investigate the structure and function of the rectal gland of the shovel-nosed ray.

METHODOLOGY
The gland from normal animals is examined by light and electron microscopy. Glands from rays subjected to osmotic stress are examined similarly. Body fluids and urine are analysed to determine changes in sodium, potassium, chloride and total electrolytes.

STATUS
Rectal glands have been processed for microscopical examination. Plasma and urine samples have been collected from normal, salt loaded and control animals. Preliminary analyses have been performed.

GEOGRAPHIC REGION: R
MAJOR DESCRIPTORS: Functional morphology/Glands/Animal morphology/Rays/
TAXONOMIC TERMS: Rhinobatus armatus

[LATROB017]

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142 **Environmental light and visual mechanisms in coral fishes.**

ORGANIZATIONS:
Monash University, Faculty of Science
Wellington Road
Clayton, Vic 3168
Australian Institute of Marine Science
PMB No. 3
Townsville MC, Qld 4810

PROJECT LEADERS:
Prof W.R.A. Muntz (03) 5654610
Dr D.McB. Williams (077) 789211

CONTACT OFFICER:
Prof W.R.A. Muntz

EXPENDITURE:
$26,971 (this year), $51,971 (all years)

MANPOWER:
1.30 (this year), 2.30 (all years)

EXTERNAL SUPPORT:
ARGS/ARC - $51,971 (Jan 1988-Dec 1989)

OBJECTIVE
To increase our knowledge of the visual mechanisms of the fishes of the inshore, mid-shelf, outer-reef and Coral Sea reefs in the central region of the Great Barrier Reef, especially in their adaptations to the quality of light in the environment.

METHODOLOGY
Light and electron-microscopy of retinal structure, characterisation of visual pigments by extracts and microspectrophotometry. Measurements will also be made of the spectral composition of the light at various locations.

STATUS

Construction of the microspectrophotometer has been proceeding: experimental work will start in 1989.

GEOGRAPHIC REGIONS: R,Z

MAJOR DESCRIPTORS: Reef fish/Vision/Light stimuli/Visual pigments/Spectral composition/

[MONASH027]

143 Algal calcification.

March 1971 -

ORGANIZATION:

Murdoch University, School of Biological and Environmental Sciences
Murdoch, WA 6150

PROJECT LEADER:

Dr M.A. Borowitzka (09) 3322333

OBJECTIVE

To elucidate the mechanism(s) of calcification in algae which normally deposit $CaCO_3$, with particular emphasis on those algae important as sediment formers or consolidators in tropical reefs.

METHODOLOGY

Location, organization and development of the $CaCO_3$-deposition mechanisms is studied by various physiological, biochemical and physical methods.

STATUS

There are a number of different mechanisms by which algae calcify, and these mechanisms show varying degrees of control by the organisms. Detailed models for the calcification mechanisms in *Halimeda* and *Chara* have been developed and models for some of the other calcareous algae have been proposed. Some aspects of the interaction between photosynthesis and calcification in the coralline reef algae *Amphiroa* have been described. The main emphasis is on the early stages of $CaCO_3$ nucleation and on the interaction between the organic components of the cell wall and the $CaCO_3$ crystal nuclei using *in vitro* model systems.

GEOGRAPHIC REGIONS: R,X

MAJOR DESCRIPTORS: Algae/Coral reefs/Calcification/Photosynthesis/

TAXONOMIC TERMS: Halimeda; Chara; Amphiroa

[MURUNI012]

144 Ecological genetics of *Anadara trapezia* .

January 1966 -

ORGANIZATION:

University of New South Wales, School of Biological Science
PO Box 1
Kensington, NSW 2033

PROJECT LEADER:

Dr P.I. Dixon (02) 6622733

EXPENDITURE:

$1,000 (this year)

MANPOWER:

0.10 (this year)

OBJECTIVES

The project is aimed at studying the biochemical and physiological differences between electrophoretic variants in *Anadara trapezia* , an intertidal bivalve mollusc. These studies will be undertaken with a view to gaining evidence as to whether or not the observed variations are adaptive in nature. In brief this will involve:

(1) Determination of the level of genetic variability in *A. trapezia* and identification of those enzymes which have electrophoretic variants.

(2) Comparisons between the electrophoretic variants in several populations of *A. trapezia* .

(3) Selection of suitable isozymes for detailed biochemical and physiological studies and the carrying out of these studies.

METHODOLOGY

Isozyme analyses followed by biochemical and physiological techniques as required.

STATUS

Phase 1 and 2 as described above proceeding, Phase 3 not yet commenced.

GEOGRAPHIC REGIONS: W,B,N,Q,R

MAJOR DESCRIPTORS: Molluscs/Physiology/Biochemistry/Genetics/Autecology/
TAXONOMIC TERMS: Anadara trapezia

[UNINSW019]

145 Physiology and anatomy of sensory receptors and central nervous systems of crustaceans.**

January 1982 -

ORGANIZATION:
University of New South Wales, School of Zoology
Kensington, NSW 2033

PROJECT LEADER:
Prof D.C. Sandeman

OBJECTIVE
To investigate the fundamental principles which govern the action of neurons in the central nervous system of animals.

METHODOLOGY
Electrophysiological, light and electron microscope techniques.

GEOGRAPHIC REGIONS: R,Q,N
MAJOR DESCRIPTORS: Crustaceans/Sense organs/Anatomy/Electrophysiology/

[UNINSW006]

146* Electrophysiology and behaviour of sponges and anthozoans.

January 1983 -

ORGANIZATION:
University of Queensland, Heron Island Research Station
via Gladstone, Qld 4680

PROJECT LEADER:
Dr I.D. Lawn (079) 781399

EXPENDITURE:
$20,282 (this year), $116,643 (all years)

MANPOWER:
1.06 (this year), 3.26 (all years)

EXTERNAL SUPPORT:
ARGS - $103,204

OBJECTIVES
1. To interpret how behaviour is controlled in invertebrates lacking a central nervous system.
2. To obtain an understanding of how nervous systems may have originated.

METHODOLOGY
Electrophysiological, behavioural, and microscopical techniques.

STATUS
A conduction system, triggered by mechanical or electrical stimulation, has been discovered in a marine sponge and its essential properties have been described. Future work will concentrate on: (1) comparative studies to see if other sponges possess similar conduction systems; and (2) the elucidation of the biophysical processes involved.
Electrophysical recordings from sea anemones and anthozoan corals are providing new information on how behaviour is controlled in these animals by both nervous and non-nervous conduction systems.
Form: Raw data/ hardcopy.
Availability: In future
Access: Project Leader.

GEOGRAPHIC REGION: R
MAJOR DESCRIPTORS: Invertebrate zoology/Electrophysiology/Behaviour/Nervous system/
TAXONOMIC TERMS: Porifera; Anthozoa

[UNIQLD050]

147 Control substances in symbioses between algae and invertebrates.

January 1983 -

ORGANIZATION:
University of Sydney, School of Biological Sciences
Sydney, NSW 2006

PROJECT LEADER:
Dr R.T. Hinde (02) 6924035

EXPENDITURE:
$33,767 (this year), $93,367 (all years)

MANPOWER:
1.00 (this year), 5.20 (all years)

EXTERNAL SUPPORT:
ARGS - $67,200
ARC - $93,592

OBJECTIVE
To investigate the physical and biochemical processes which allow and promote the movement of metabolites between partners in mutualistic symbioses, with particular emphasis on "Host Release Factors" (HRFs).

METHODOLOGY
1. $NaH^{14}CO_3$ as tracer of rates and products of photosynthesis, rates of translocation of photosynthate from plant to animal cells, and the nature of compounds translocated.
2. Bioassays for HRF activity and studies of the physiology of HRF-simulated translocation.
3. Chromatography, HPLC ultrafiltration and other biochemical methods for isolation of biologically active compounds are being used in attempts to purify HRF.

STATUS
The following have been established:
1. That there are effective symbioses, of nutritional significance to the animal hosts, between the nudibranch *Pteraeolidia ianthina* and its zooxanthellae, and between the zoanthid, an unidentified *Zoanthus robustus* and its zooxanthellae.
2. The levels of HRF activity in the hard coral *Plesiastrea versipora* , in *Z. robustus* and in *P. ianthina* , and the repeatability, and consistency throughout the year, of the HRF effect.
3. The effectiveness of crude preparations of HRF from each of these animal species against zooxanthellae of the others.
4. A bioassay for HRF activity *in vitro* in these three symbioses.
5. The approximate size of the active compounds; some degree of purification has been achieved.
6. Calcium, phosphate, ammonia and pH have been shown to not cause HRF-like effects.
7. Time courses for labelling of products of photosynthesis in algae and host and pulse-chase data on products.

CO-ORDINATION WITH OTHER PROJECTS
There is collaboration with Dr R.J. Quinn (Griffith University), who is investigating HRF in an anemone.

LOCALITIES: Sydney; One Tree Island
GEOGRAPHIC REGIONS: N,R
MAJOR DESCRIPTORS: Invertebrates/Algae/Symbiosis/Metabolites/Biochemical analysis/
TAXONOMIC TERMS: Pteraeolidia ianthina; Zoanthus robustus; Plesiastrea versipora

[UNISYD039]

148 Ecophysiological and nutritional aspects of symbioses between algae and sponges.

June 1982 - December 1988

ORGANIZATIONS:
University of Sydney, School of Biological Sciences
Sydney, NSW 2006
Murdoch University, School of Biological and Environmental Sciences
Murdoch, WA 6150

PROJECT LEADERS:
Dr R.T. Hinde (02) 6924035
Dr M.A. Borowitzka (09) 3322211

CONTACT OFFICER:
Dr R.T. Hinde

EXPENDITURE:
$500 (this year), $61,744 (all years)

MANPOWER:
0.15 (this year), 5.45 (all years)

EXTERNAL SUPPORT:
MSTGS - $58,244

OBJECTIVE

To establish the role of the blue-green algal symbiont of a tropical marine sponge in the nutrition of the sponge.

METHODOLOGY

1. Use of oxygen electrode to establish levels and variability of photosynthesis and respiration in *Dysidea herbacea* and its blue-green algal symbiont, *Oscillatoria spongeliae* .
2. Use of carbon-14 to establish pathways of carbon fixation and nature and amounts of photosynthetic products transferred from alga to sponge.
3. Electron microscopy.
4. Culture of the blue-green algae and study of their metabolism when away from the sponge.

STATUS

Completed work on variability within and between sponges, and seasonal variability of photosynthetic and respiratory rates has been completed, along with a study of the uptake of $^{14}CO_2$ in the light and dark. Incorporation of ^{14}C into various tissue fractions and soluble compounds, both during and after a period of photosynthesis, has been studied. The ultrastructure of *O. spongeliae* and its location within the sponge have been described. The algal symbionts can be isolated and are viable for at least 10 hours. Attempts to establish cultures are underway.

LOCALITY: Sydney
GEOGRAPHIC REGIONS: R,N
MAJOR DESCRIPTORS: Sponges/Algae/Symbiosis/Nutrition/Ecophysiology/
TAXONOMIC TERMS: Dysidea herbacea; Oscillatoria spongeliae

[UNISYD010]

149 Eco-physiological aspects of symbioses between algae and sponges.

June 1982 - December 1991

ORGANIZATIONS:

University of Sydney, School of Biological Sciences
Building A12
Sydney, NSW 2006

Murdoch University, School of Biological and Environmental Sciences
Murdoch, WA 6150

PROJECT LEADERS:

Dr R.T. Hinde (02) 6924035
Dr M.A. Borowitzka (09) 3322211

CONTACT OFFICER:

Dr R.T. Hinde

EXPENDITURE:

$200 (this year), $4,335 (all years)

MANPOWER:

0.05 (this year), 0.65 (all years)

EXTERNAL SUPPORT:

MSTGS (Part of grant of $58244)

OBJECTIVE

To establish the role of the blue-green algal symbiont (*Oscillatoria spongeliae*) of the tropical marine sponge *Dysidea herbacea* in the synthesis of halogenated secondary metabolites which may have anti-feedant activity.

METHODOLOGY

1. The amounts of the secondary metabolites present in isolated algal cells and sponge tissue will be determined by quantitative chromatographic techniques.
2. If the algae contain the metabolites of interest, incorporation of radioactively labelled precursors will be investigated to identify the site(s) of synthesis of the compounds.

STATUS

The halogenated metabolite of the One Tree Island population has been identified, and occurs in both the algal and animal tissue. Studies of its synthesis will proceed in 1989.

CO-ORDINATION WITH OTHER PROJECTS

Collaboration with Dr R.J. Quinn (Griffith University)

LOCALITY: One Tree Island
GEOGRAPHIC REGION: R
MAJOR DESCRIPTORS: Algae/Sponges/Symbiosis/Ecophysiology/Metabolites/
TAXONOMIC TERMS: Dysidea herbacea; Oscillatoria spongeliae

[UNISYD107]

150 Light-harvesting pigment-proteins of algae.

January 1974 -

ORGANIZATION:
University of Sydney, School of Biological Sciences
Building A12
Sydney, NSW 2006

PROJECT LEADERS:
Assoc Prof A.W.D. Larkum (02) 6922069
Dr J. Chrystal (02) 6922277

CONTACT OFFICER:
Assoc Prof A.W.D. Larkum

EXPENDITURE:
$14,500 (this year), $42,000 (all years)

MANPOWER:
1.00 (this year), 2.00 (all years)

EXTERNAL SUPPORT:
ARGS - $7,000 (Grant to Dr R.G. Hiller and A.W.D. Larkum)
CSIRO - $7,500 (Postgraduate scholarship for Ms J Chrystal)

OBJECTIVE
To investigate the mechanisms of light-harvesting in algae, with particular reference to the role of light-harvesting pigment proteins.

METHODOLOGY
Pigment proteins are separated by gel electrophoresis and density gradient fractionation. Algae are cultured under different light intensities and colours in the laboratory, or are brought up from various depths and types of water.

STATUS
Previous work on systems based on phycobiliproteins has been extended to systems using chlorophyll a + c complexes and in the case of Eustigmatophyta and chlorophyll a complexes. Two journal publications accepted.

CO-ORDINATION WITH OTHER PROJECTS
This work is being carried out in close collaboration with Dr R.G. Hiller, Macquarie University (ARGS Grant)

GEOGRAPHIC REGIONS: R,Q,N

MAJOR DESCRIPTORS: Algae/Photosynthetic pigments/Proteins/Plant physiology/

[UNISYD009]

151 Prokaryotic algal symbionts on a coral reef.

January 1984 -

ORGANIZATION:
University of Sydney, School of Biological Sciences
Building A12
Sydney, NSW 2006

PROJECT LEADERS:
Assoc Prof A.W.D. Larkum (02) 6922069
Dr G.C. Cox (02) 6923176

CONTACT OFFICER:
Assoc Prof A.W.D. Larkum

EXPENDITURE:
$23,000 (this year), $53,500 (all years)

MANPOWER:
1.30 (this year), 5.20 (all years)

EXTERNAL SUPPORT:
ARGS - $15,000
Australian Museum Lizard Island Fellowship - $10,500

OBJECTIVE
To search for novel prokaryotic algae in symbiotic associations on coral reefs.

METHODOLOGY
Algae are released from host tissues by gentle homogenisation. Electron microscopy is carried out on original samples and on isolated algal cells. The photosynthetic pigments are investigated by thin layer chromatography.

STATUS

Research began in association with Dr R.G. Hiller (Macquarie University) and Dr G.C. Cox (Sydney University) on the association of *Prochloron* with didemnid ascidians. Attention was then turned to other prokaryotic algae in certain of these ascidians. The algae are similar to the previously described *Synechocystis trididemni* . They contain novel phycobiliproteins (Cox, Hiller and Larkum, Mar. Biol. 89, 149 (1985). Probably identical algae have been found in some crustose sponges. Filamentous cyanophytes with similar phycobiliproteins are now being studied (Mr D Parry, Chemistry Department, University of Queensland is also collaborating in this work). Another new symbiont was discovered in 1987 in Pseudaxinyssa species of sponges at Lizard Island and Davies Reef in the middle and northern sections of the Great Barrier Reef. The symbiont is a new species of *Synechocystis* , as yet undescribed, which has large amounts of phycourobilin (Larkum, Cox and Dibbayawan. Proceedings of the Sixth International Coral Reef Symp., in press). A third type of symbiont, which is filamentous and contains novel phycoerythrins, has been investigated in a number of sponges and one ascidian. (J. Mar. Biol. 95, 1985).

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Ascidians/Algae/Symbionts/Coral reefs/Photosynthetic pigments/

TAXONOMIC TERMS: Synechocystis trididemni; Synechocystis; Oscillatoria; Prochloron

[UNISYD047]

See also:

53* The isolation of novel compounds from marine invertebrates.
58 Multielement analysis of marine sediments and tissues of marine organisms.
94 Structure and physiology of mycorrhizas of plants of coral islands.
153 Geographical variation in the interaction between marine herbivores and chemical defenses of brown algae.
154 Isolation and reconstitution of pigment-protein complexes of algae.
245* Nutrient metabolism in corals and the interaction between host and symbiont.

152 Chemistry of the ascidiacea.

January 1987 -

ORGANIZATIONS:

Northern Territory University, Faculty of Science
GPO Box 1341
Darwin, NT 0801

University of Queensland, Department of Chemistry
St Lucia, Qld 4067

PROJECT LEADERS:

Dr D.L. Parry (089) 462201
Prof C.J. Hawkins (07) 3772384

CONTACT OFFICER:

Dr D.L. Parry

EXPENDITURE:

$16,500 (this year), $33,000 (all years)

MANPOWER:

1.25 (this year), 3.00 (all years)

OBJECTIVES

1. Isolation and characterisation of blood plasma and blood cell proteins and low molecular weight compounds in ascidians.
2. Metal complexes of the blood components.

METHODOLOGY

A range of ascidian species collected from the Great Barrier Reef and northwest and north Australia. Metal concentration determined for whole animal, blood cells and blood plasma. Blood cell lysates and plasma are chromatographed to isolate components. Compounds isolated are characterised using gel electrophoresis, UV-VIS, MNR and ESR spectroscopy, amino acid analysis.

STATUS

1. Metal concentrations (V, Fe, Cu, Mn, Zn) have been determined in 75 species of ascidians from the Great Barrier Reef and Darwin area.
2. Blood cell and blood plasma components have been isolated from the *Polycarpa* spp. complex.

GEOGRAPHIC REGIONS: R,Y

MAJOR DESCRIPTORS: Urochordates/Biochemical analysis/Blood/Blood cells/

TAXONOMIC TERMS: Ascidiacea; Polycarpa

[NTUNI-002]

153 Geographical variation in the interaction between marine herbivores and chemical defenses of brown algae.

August 1986 -

ORGANIZATIONS:

University of Sydney, School of Biological Sciences
Macleay Building A12
Sydney, NSW 2006

University of Adelaide, Department of Organic Chemistry
Adelaide, SA 5001

PROJECT LEADERS:

Dr P.D. Steinberg (02) 6924241
Dr I.A. Van Altena (08) 2285960

CONTACT OFFICER:

Dr P.D. Steinberg

EXPENDITURE:

$57,000 (this year), $120,000 (all years)

MANPOWER:

1.80 (this year), 4.00 (all years)

EXTERNAL SUPPORT:

Queen Elizabeth II Fellowship (1986-88) - $97,500
MSTGS/ARC (1988 - $22,500; 1989 - $41,778)

OBJECTIVES

The principal goal of the project is to understand how secondary metabolites (chemical defenses) mediate the interaction between marine benthic algae (seaweeds) and their herbivores. To do this requires understanding (1) how different algae and different compounds affect the behaviour and physiology of the herbivores, and (2) the impact of the herbivores on the algae. The emphasis in this project is on brown seaweeds (Phaeophyta) and polyphenolic compounds.
An important secondary goal is to compare these interactions in temperate Australasia with previous work in North America.

METHODOLOGY

The methodology used includes: 1) quantification, isolation, and identification of algal secondary metabolites through colorimetric assays, fractionation and purification, chromatography, and NMR; 2) feeding experiments with echinoid and molluscan herbivores in which the effects of different algae and different pure secondary metabolites on behaviour, growth and physiology of the herbivores are examined. These experiments are done in the laboratory and field; and 3) manipulative field experiments involving caging and transplants of herbivores or seaweeds in which the effects of the herbivores on the algae are measured.

STATUS

Amounts and diversity of secondary metabolites in the dominant brown algae of temperate Australasia are much greater than in comparable seaweeds in North America. Common invertebrate herbivores in Australasia show considerable tolerance to levels of one class of compounds, polyphenolics, that strongly deter North American herbivores. Australasian herbivores are often deterred by non-polar algal secondary metabolites such as terpenes. Invertebrate herbivores in Australia have strong effects on seaweed populations, but the intensity of these effects are not correlated with production of polyphenolics by the plants. The most important chemical defense in the dominant component of the algal flora in North America thus has little effect on the interaction between herbivores and seaweeds in temperate (or tropical) Australasia. Other compounds, however, to date less well studied, are likely to be important. Currently, our focus is expanding to incorporate work on inducible chemical defenses and tropical algae.

CO-ORDINATION WITH OTHER PROJECTS

Collaborative project on the ecology of tropical *Sargassum* with AIMS and James Cook University, headed by Dr Karen Edyvane.

GEOGRAPHIC REGIONS: N,B,S,G,R

MAJOR DESCRIPTORS: Algae/Metabolites/Herbivores/Interspecific relationships/Geographical distribution/

TAXONOMIC TERMS: Phaeophyta

[UNISYD177]

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154 **Isolation and reconstitution of pigment-protein complexes of algae.**

January 1979 -

ORGANIZATION:
University of Sydney, School of Biological Sciences
Sydney, NSW 2006

PROJECT LEADER:
Assoc. Prof. A.W.D. Larkum (02) 6922069

EXPENDITURE:
$0 (this year), $36,000 (all years)

MANPOWER:
1.00 (this year), 7.00 (all years)

EXTERNAL SUPPORT:
ARGS - $14,000

OBJECTIVE

Investigation of the structure and function of pigment-protein complexes of a variety of unicellular algae, particularly from the following group: Cryptophyta, Eustigmatophyta, Prymnesiophyta, Chrysophyta, Phaeophyta, Rhodophyta, Cyanophyta and Prochlorophyta.

METHODOLOGY

Isolation of complexes by detergents, sucrose gradient centrifugation polyacrylamide electrophoresis and column chromatography. Identification of complexes by absorption spectrophotometry, low-temperature fluorimetry, electrophoresis and immunochemistry.

STATUS

Work has been completed on the chlorophyll-protein complexes of *Griffithsia* (Rhodophyta), *Pavlova lutheri* (Prymnesiophyta), *Prochloron* (Prochlorophyta) and *Chroomonas* (Cryptophyta). Further work is continuing on 1. *Polyedriella* (Eustigmatophyta) 2. reconstitution of the chlorophyll *a*/ c_2 complex of *Chroomonas* and 3. reconstitution of the PSII-phycobilisome particle of *Griffithsia*. Recent work has concerned cloning of genes from the genome of *Prochloron*, including atp, Cab and psbA.

GEOGRAPHIC REGIONS: R,N

MAJOR DESCRIPTORS: Algae/Proteins/Pigments/Biochemical analysis/

TAXONOMIC TERMS: Griffithsia; Pavlova lutheri; Prochloron; Chroomonas; Polyedriella

[UNISYD057]

155 **Production of bioactive metabolites by marine sponges.**

January 1989 -

ORGANIZATIONS:
University of Wollongong, Department of Chemistry
PO Box 1144
Wollongong, NSW 2500
Australian Institute of Marine Science
PMB No. 3
Townsville, Qld 4810

PROJECT LEADERS:
Dr M.J. Garson (042) 270516
Dr P.T. Murphy (077) 789211

CONTACT OFFICER:
Dr M.J. Garson

MANPOWER:
1.00 (this year), 1.00 (all years)

EXTERNAL SUPPORT:
ARC - $34,819 (Jan 1989-Dec 1989)

OBJECTIVE

To optimise experimental conditions for the rapid and efficient production of bioactive marine metabolites in marine sponges.

METHODOLOGY

Cell fractionation techniques are used to purify individual cell types, which are then reaggregated under cultural conditions. The role of symbionts in metabolite production is tested by incorporation of radiolabelled precursors.

STATUS

Work on 2 Great Barrier Reef sponges is in progress at John Brewer Reef, Townsville.

LOCALITY: John Brewer Reef
GEOGRAPHIC REGION: R
SHIP TIME REQUIREMENTS: 12 days
MAJOR DESCRIPTORS: Sponges/Metabolites/Symbionts/

[UNIWOL002]

See also:

49 Oxidation-reduction photochemistry in marine systems.
59 Radionuclides in the study of marine processes.
138 The effects of fuel oil, oil emulsifier and lower salinity upon the common Indo-Pacific reef coral *Acropora formosa* .
265 The role of sponges in the ecology of coral reefs.

156* ACANTHASTER ECOLOGY, DEMOGRAPHY AND GENETICS: Distribution and abundance of crown-of-thorns starfish and corals on the Great Barrier Reef.

June 1986 - June 1991

ORGANIZATION:
Australian Institute of Marine Science
PMB No. 3
MC Townsville,
Qld 4810.

PROJECT LEADERS:
Dr P. Moran (077) 789211
Ms D. Bass
Mr D. Johnson
Mr B. Miller-Smith
Mr C. Mundy

CONTACT OFFICER:
Dr P. Moran

OBJECTIVES

(1) To conduct macroscale surveys of the distribution and abundance of crown-of-thorns starfish and corals.
(2) To conduct mesoscale surveys of the distribution and abundance of crown-of-thorns starfish and corals.

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Coral/Coral reefs/Crown of thorns starfish/Quantitative distribution/ Geographical distribution/

TAXONOMIC TERMS: Acanthaster planci

[AIMS21006]

157* ACANTHASTER ECOLOGY, DEMOGRAPHY AND GENETICS: Effects of outbreaks of the crown-of-thorns starfish on fish communities.

June 1986 - June 1991

ORGANIZATION:
Australian Institute of Marine Science
PMB No. 3
MC Townsville,
Qld 4810.

PROJECT LEADER:
Dr D. Williams (077) 789211

OBJECTIVES

(1) To investigate any changes in the abundance of adult fish.
(2)To determine the long-term effects of outbreaks of crown-of-thorns starfish on the recruitment of reef fishes.

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Reef fish/Crown of thorns starfish/Population number/Recruitment/

TAXONOMIC TERMS: Acanthaster planci

[AIMS21007]

158* ACANTHASTER ECOLOGY, DEMOGRAPHY AND GENETICS: Ephemeral patches of phytoplankton in the central Great Barrier Reef as a potential food source for larvae of *Acanthaster planci*.

June 1986 - December 1989

ORGANIZATION:
Australian Institute of Marine Science
PMB No. 3
MC Townsville,
Qld 4810.

PROJECT LEADERS:
Dr M. Furnas (077) 789211
Mr P. Liston

CONTACT OFFICER:
Dr M. Furnas

OBJECTIVE

To conduct a phytoplankton biomass survey of central Great Barrier Reef waters to locate and map discrete patches and/or layers of enhanced phytoplankton biomass derived from or associated with summer intrusions of nutrient enriched water.

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Invertebrate larvae/Phytoplankton/Chlorophylls/Vertical profiling/Crown of

thorns starfish/

TAXONOMIC TERMS: Acanthaster planci

[AIMS21005]

159* **ACANTHASTER ECOLOGY, DEMOGRAPHY AND GENETICS: Evaluating procedures for the verification of Landsat images with reference to the effects of *Acanthaster planci* on reefs.**

June 1986 - July 1988

ORGANIZATIONS:

Australian Institute of Marine Science
PMB No. 3
MC Townsville,
Qld 4810.

CSIRO, Division of Water Resources

PROJECT LEADERS:

Dr R. Reichelt (077) 789211
Dr D. Jupp (CSIRO)
Mr S. Bainbridge

CONTACT OFFICER:

Dr R. Reichelt

OBJECTIVES

(1) To determine whether remote sensing techniques offer a viable cost effective alternative to ground based surveys of coral damage caused by crown-of-thorns starfish.
(2) To enhance the substrate reflectance in Landsat imagery with respect to reef damage by crown-of-thorns starfish.

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Coral reefs/Crown of thorns starfish/Biological damage/Satellite sensing/

TAXONOMIC TERMS: Acanthaster planci

[AIMS21008]

160* **ACANTHASTER ECOLOGY, DEMOGRAPHY AND GENETICS: Investigations of adult crown-of-thorns starfish in the field.**

June 1986 - June 1991

ORGANIZATIONS:

Australian Institute of Marine Science
PMB No. 3
MC Townsville,
Qld 4810.

James Cook University of North Queensland

PROJECT LEADERS:

Dr P. Moran (077) 789211
Dr D. Klumpp
Dr J.S. Lucas (JCU)
Dr R. Reichelt
Mr J. Keesing

CONTACT OFFICER:

Dr P. Moran

OBJECTIVES

(1) To investigate the feeding preferences of crown-of-thorns starfish in the field.
(2) To examine the feeding rate and behaviour of adult starfish in the field.
(3) To determine the rate of decomposition of adult crown-of-thorns starfish in the field.

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Crown of thorns starfish/Feeding behaviour/Food preferences/Degradation/

TAXONOMIC TERMS: Acanthaster planci

[AIMS21004]

161* **ACANTHASTER ECOLOGY, DEMOGRAPHY AND GENETICS: Investigations of the larvae of the crown-of-thorns starfish.**

June 1986 - June 1991

ORGANIZATION:

Australian Institute of Marine Science
PMB No. 3
MC Townsville,
Qld 4810.

PROJECT LEADERS:

Dr R. Olson (Harbor Branch Institution, Florida USA)
Mr P. Dixon (077) 789211

CONTACT OFFICER:

Mr P. Dixon

OBJECTIVES

(1) To undertake a field test of the larval starvation hypothesis.
(2) To examine the vertical migration and phototaxis of larvae.
(3) To investigate substrate selection in larvae of the crown-of-thorns starfish.
(4) To develop techniques to culture large numbers of larvae and juveniles.

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Invertebrate larvae/Starvation/Coral reefs/Submerged cages/Phototaxis/ Vertical migrations/Substrate preferences/ Crown of thorns starfish/

TAXONOMIC TERMS: Acanthaster planci

[AIMS21003]

162* ACANTHASTER ECOLOGY, DEMOGRAPHY AND GENETICS: Mathematical models and analyses of existing data.

June 1986 - June 1991

ORGANIZATIONS:

Australian Institute of Marine Science
PMB No. 3
MC Townsville,
Qld 4810.

University of Alberta
Canada

Australian National University

CSIRO

PROJECT LEADERS:

Dr R. Bradbury (077) 789211
Dr R. Reichelt
Dr P. Antonelli (Alberta)
Dr D. Green (ANU)
Dr M. Dale (CSIRO)

CONTACT OFFICER:

Dr R. Bradbury

OBJECTIVES

(1) To develop qualitative models of the crown-of-thorns phenomenon where the data are considered as a grammar of reef states written in time.
(2) To undertake a statistical summary of the Crown-of-thorns Starfish Database.
(3) To develop non-spatial models of the crown-of-thorns predator and its coral prey.
(4) To model the outbreak behaviour on a single reef using a simple spatial model.
(5) To model the large scale wave behaviour of outbreaks on the Great Barrier Reef using a spatial model derived from a reaction-diffusion-transport system of differential equations.
(6) To develop continuous analogues of state transition models of the crown-of- thorns phenomenon.
(7) To undertake a predictive analysis of the Crown-of-thorns Database.

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Coral reefs/Crown of thorns starfish/Mathematical models/Infestations/ Databases/

TAXONOMIC TERMS: Acanthaster planci

[AIMS21010]

163* ACANTHASTER ECOLOGY, DEMOGRAPHY AND GENETICS: Numerical models of the hydrodynamic regime around reefs with reference to the crown-of-thorns starfish.

June 1986 - June 1991

ORGANIZATIONS:

Australian Institute of Marine Science
PMB No. 3
MC Townsville,
Qld 4810.

Victorian Institute of Marine Sciences

PROJECT LEADERS:

Dr J.C. Andrews (077) 789211
Dr K.P. Black

CONTACT OFFICER:

Dr J.C. Andrews

OBJECTIVES

(1)To identify what variations in larval dispersal of the crown-of-thorns starfish may occur as a result of the interaction with tidal currents and waves over different reef morphologies and hydrodynamic regimes.
(2) To calculate the patterns of trajectories, residence times, probabilities of retention and dispersal of larvae of *Acanthaster planci* for situations where they are released and advected into the reefal environs of John Brewer Reef.

LOCALITY: John Brewer Reef
GEOGRAPHIC REGION: R
MAJOR DESCRIPTORS: Invertebrate larvae/Dispersion/Tidal currents/Wave effects/Mathematical models/Crown of thorns starfish/
TAXONOMIC TERMS: Acanthaster planci

[AIMS21009]

164* **ACANTHASTER ECOLOGY, DEMOGRAPHY AND GENETICS: Population genetics of populations of crown-of-thorns starfish and corals.**

June 1986 - December 1988

ORGANIZATION:
Australian Institute of Marine Science
PMB No. 3
MC Townsville,
Qld 4810.

PROJECT LEADERS:
Dr J. Benzie (077) 789211
Dr J. Stoddart

CONTACT OFFICER:
Dr J. Benzie

OBJECTIVES

(1) To determine the geographic patterns in genetic variation of *Acanthaster planci* .
(2) To examine the proposed genetic basis of *Acanthaster planci* banding patterns.
(3) To examine the effects of outbreaks of *A. planci* on the genetic structure of populations of *Acropora humilis* .

GEOGRAPHIC REGION: R
MAJOR DESCRIPTORS: Coral/Ecological distribution/Genetics/Crown of thorns starfish/ Interspecific relationships/
TAXONOMIC TERMS: Acropora humilis; Acanthaster planci

[AIMS21001]

165* **ACANTHASTER ECOLOGY, DEMOGRAPHY AND GENETICS: Recovery and recolonisation of corals after outbreaks of crown-of- thorns starfish.**

June 1986 - June 1991

ORGANIZATION:
Australian Institute of Marine Science
PMB No. 3
MC Townsville,
Qld 4810.

PROJECT LEADERS:
Dr T. Done (077) 789211
Dr P. Moran

CONTACT OFFICER:
Dr T. Done

OBJECTIVES

(1) To investigate the recovery of hard corals after outbreaks of crown-of-thorns starfish.
(2) To interpret the history of disturbance to coral communities through analysis of the morphology and population structure in massive corals.
(3) To study the growth and survivorship of coral remnants after outbreaks of crown-of-thorns starfish.

GEOGRAPHIC REGION: R
MAJOR DESCRIPTORS: Coral/Predators/Mortality causes/Survival/Crown of thorns starfish/
TAXONOMIC TERMS: Acanthaster planci

[AIMS21002]

166* **ACANTHASTER ECOLOGY, DEMOGRAPHY AND GENETICS: Tagging of the crown-of-thorns starfish using passive micro- injectable transponders.**

June 1986 - June 1991

ORGANIZATIONS:
Australian Institute of Marine Science
PMB No. 3
MC Townsville,
Qld 4810.
Deakin University

PROJECT LEADERS:
Dr P. Moran (077) 789211
Dr R.D. Peden

CONTACT OFFICER:
Dr P. Moran

OBJECTIVE

(1) To determine whether passive integrated transponders (PITS) are suitable as a means of identifying crown-of- thorns starfish in the field over relatively long periods.

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Tags/Transponders/Crown of thorns starfish/

TAXONOMIC TERMS: Acanthaster planci

[AIMS21011]

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167 **ASEAN living resources project.**

June 1986 - June 1990

ORGANIZATION:

Australian Institute of Marine Science
PMB No. 3
MC Townsville,
Qld 4810.

PROJECT LEADER:

Dr K. Boto (077) 789211

OBJECTIVES

(1) To generate quantitative, management-relevant baseline information on the structure, distribution and dynamics of nutrient, carbon and energy budgets of coral-reef, mangrove and nearshore soft-bottom ecosystems in the ASEAN region, with particular emphasis on inter-system dependencies.
(2) To develop scientific and technical expertise within the ASEAN region to facilitate the planning, acquisition, exchange and application of information relevant to the management of the coastal zone in the regional interests of ASEAN countries.

GEOGRAPHIC REGIONS: R,P,I

MAJOR DESCRIPTORS: Coastal zone management/Living resources/Baseline studies/Nutrient cycles/Energy budget/

[AIMS10501]

168* **BIOLOGICAL ACTIVE SUBSTANCES FROM MARINE ORGANISMS: Assessment of marine organisms as potential antitumour, antiviral, antifungal and immunomodulatory agents.**

June 1987 - June 1991

ORGANIZATIONS:

Australian Institute of Marine Science
PMB No. 3
MC Townsville,
Qld 4810.

Northern Territory Museum of Arts and Sciences

PROJECT LEADERS:

Dr J.T. Baker (077) 789211
Dr P. Murphy
Mr J. Hooper (Museum)

CONTACT OFFICER:

Dr J.T. Baker

EXTERNAL SUPPORT:

NCI (Grant administered through Sea Pharm (USA))

OBJECTIVE

To collect marine organisms, then extract and screen them for antitumour, antiviral, antifungal and immunomodulatory activity. The screening is carried out at Harbor Branch in Florida, and the follow-up chemical isolation and structural elucidation of the compounds responsible for the activity is conducted at AIMS. (This task is fully supported by the Harbor Branch Oceanographic Institution, Fort Pierce, Florida.)

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Aquatic drugs/Invertebrates/

[AIMS30401]

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169 **COASTAL BIOGEOCHEMISTRY: Nitrogen and plankton dynamics in shelf waters of the central GBR.**

June 1986 - June 1991

ORGANIZATION:
Australian Institute of Marine Science
PMB No. 3
MC Townsville,
Qld 4810.

PROJECT LEADER:
Dr M. Furnas (077) 789211

OBJECTIVE

To establish seasonal and cross-shelf variations in organic and inorganic nitrogen turnover rates and phytoplankton uptake kinetics.

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Phytoplankton/Primary production/Nitrogen/Nutrient cycles/Shelf dynamics/

[AIMS10302]

170 COASTAL DYNAMICS: Dynamics of estuarine and coastal water and fluid mud dynamics.

June 1986 - June 1991

ORGANIZATIONS:
Australian Institute of Marine Science
PMB No. 3
MC Townsville,
Qld 4810.
University of Sydney
Australian National University
University of Western Australia

PROJECT LEADERS:
Dr E. Wolanski (077) 789211
Dr I. Jones (U Syd)
Dr M. Tomczak (U Syd)
Dr J. Sodousta (U Syd)
Dr J. Chappell (ANU)
Dr J. Imberger (Uni WA)

CONTACT OFFICER:
Dr E. Wolanski

OBJECTIVE

To study the dynamics of mud and water transport in the coastal zone with particular reference as to how such processes may influence dispersal patterns of larvae and plant propagules and the transport of materials from mangroves and estuaries.

GEOGRAPHIC REGIONS: R,C

MAJOR DESCRIPTORS: Mangrove swamps/Estuarine dynamics/Coastal boundary layer/Fluid mud/

[AIMS10401]

171 COASTAL PELAGIC RESOURCES: Distribution and dynamics of baitfish.

June 1987 - June 1991

ORGANIZATION:
Australian Institute of Marine Science
PMB No. 3
MC Townsville,
Qld 4810.

PROJECT LEADERS:
Dr D. Williams (077) 789211
Dr A. Robertson
Dr J. Andrews

CONTACT OFFICER:
Dr D. Williams

OBJECTIVE

To determine daily, monthly and annual variation in distribution, reproductive activity and age-structure of juveniles and adults of the major baitfish spp. (*Amblygaster, Decapterus, Herklotsichthys, Sardinella*) in the vicinity of Bowling Green Bay in relation to physical oceanographic processes.

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Bait fish/Ecological distribution/Reproductive behaviour/Physical oceanography/

TAXONOMIC TERMS: Amblygaster; Decapterus; Herklotsichthys; Sardinella

[AIMS10604]

172 COASTAL PELAGIC RESOURCES: Distribution and dynamics of billfish.

June 1987 - June 1991

ORGANIZATIONS:
Australian Institute of Marine Science
PMB No. 3
MC Townsville,
Qld 4810.
James Cook University of North Queensland
New South Wales Department of Agriculture,
Fisheries Research Institute

PROJECT LEADERS:
Dr D. Williams (077) 789211
Mr P. Speare
Dr J. Choat (JCU)
Mr L. Owens (JCU)
Dr J. Pepperell (NSW Fisheries)

CONTACT OFFICER:
Dr D. Williams

OBJECTIVE
To determine seasonal and geographical distributions of billfish using parasites as population tags (P. Speare), tagging (J. Pepperell) and fishermen's log-books (Dr D. Williams).

GEOGRAPHIC REGION: R
MAJOR DESCRIPTORS: Reef fish/Geographical distribution/Seasonal distribution/Parasites/ Tags/
TAXONOMIC TERMS: Clupeidae

[AIMS10603]

173 COASTAL PELAGIC RESOURCES: Distribution and dynamics of clupeid larvae.

June 1987 - June 1991

ORGANIZATIONS:
Australian Institute of Marine Science
PMB No. 3
MC Townsville,
Qld 4810.
James Cook University of North Queensland

PROJECT LEADERS:
Dr D. Williams (077) 789211
Dr J. Andrews
Dr S. Thorrold (JCU)
Dr J. Choat (JCU)

CONTACT OFFICER:
Dr D. Williams

OBJECTIVE
To determine distribution, dispersal and life-histories of larval clupeids (*Amblygaster, Herklotsichthys, Sardinella*) in the vicinity of Bowling Green Bay in relation to physical oceanographic processes.

GEOGRAPHIC REGION: R
MAJOR DESCRIPTORS: Bait fish/Fish larvae/Oceanographic data/
TAXONOMIC TERMS: Amblygaster; Herklotsichthys; Sardinella

[AIMS10605]

174 COASTAL PELAGIC RESOURCES: Distribution and dynamics of food of baitfish.

June 1987 -

ORGANIZATION:
Australian Institute of Marine Science
PMB No. 3
MC Townsville,
Qld 4810.

PROJECT LEADERS:
Dr D. Williams (077) 789211
Dr M. Furnas
Mr P. Liston

CONTACT OFFICER:
Dr D. Williams

OBJECTIVE
To determine distribution and dynamics of major food of major baitfish in the vicinity of Bowling Green Bay in relation to physical oceanography.

LOCALITY: Bowling Green Bay
GEOGRAPHIC REGION: R
MAJOR DESCRIPTORS: Bait fish/Oceanographic data/Food organisms/
TAXONOMIC TERMS: Clupeidae

[AIMS10606]

175 COASTAL PELAGIC RESOURCES: Physical environment: circulation models and monitoring.

June 1987 - June 1991

ORGANIZATION:
Australian Institute of Marine Science
PMB No. 3
MC Townsville,
Qld 4810.

PROJECT LEADERS:
Dr J. Andrews (077) 789211
Dr D. Williams

CONTACT OFFICER:
Dr J. Andrews

OBJECTIVE

To produce predictive models of broadscale (> 1 km) circulation of waters in the vicinity of, and within, Bowling Green Bay for prediction and explanation of distributions of billfish-baitfish and dispersal of baitfish.

LOCALITY: Bowling Green Bay
GEOGRAPHIC REGION: R
MAJOR DESCRIPTORS: Coastal waters/Dispersion/Bait fish/Pelagic fisheries/Ecological distribution/
TAXONOMIC TERMS: Clupeidae

[AIMS10601]

176 COASTAL TROPHODYNAMICS: Carbon, nitrogen and phosphorus flows within mangroves.

June 1986 - June 1989

ORGANIZATIONS:
Australian Institute of Marine Science
PMB No. 3
MC Townsville,
Qld 4810.
Department of Sea Fisheries Tasmania

PROJECT LEADERS:
Dr K. Boto (077) 789211
Dr D. Alongi
Dr A. Robertson

CONTACT OFFICER:
Dr K. Boto

OBJECTIVES

1. To evaluate the flux of dissolved organics and nutrients generated in below-ground anaerobic processes, and their role in bacterial production.
2. To determine major nitrogen fixation sources and their contribution to forest nitrogen requirements.

GEOGRAPHIC REGION: R
MAJOR DESCRIPTORS: Mangrove swamps/Dissolved organic carbon/Dissolved organic nitrogen/ Dissolved organic phosphorus/Anaerobic bacteria/

[AIMS10204]

177 COASTAL TROPHODYNAMICS: Connections between mangroves and subtidal near-shore systems.

June 1986 - June 1991

ORGANIZATIONS:
Australian Institute of Marine Science
PMB No. 3
MC Townsville,
Qld 4810.
Department of Sea Fisheries Tasmania

PROJECT LEADERS:
Dr D. Alongi (077) 789211
Dr A. Robertson
Dr K. Boto

CONTACT OFFICER:
Dr D. Alongi

OBJECTIVE

To determine the influence of exported mangrove detritus on near-shore food chains and benthic systems.

GEOGRAPHIC REGION: R
MAJOR DESCRIPTORS: Mangrove swamps/Detritus/Coastal zone/Food chains/

[AIMS10205]

178 COASTAL TROPHODYNAMICS: Higher level trophic processes within mangroves.

June 1986 - June 1991

ORGANIZATION:
Australian Institute of Marine Science
PMB No. 3
MC Townsville,
Qld 4810.

PROJECT LEADERS:
Dr A. Robertson (077) 789211
Dr D. Alongi
Dr K. Boto
Dr S. Cragg (UK)

CONTACT OFFICER:
Dr A. Robertson

OBJECTIVES
(1) To determine the trophic role of sesarmid crabs in mangroves.
(2) To evaluate the relative rates of plant detrital processing in mangrove, including trunk decomposition.
(3) To determine distribution patterns and feeding habits of major marine invertebrates within mangrove forests/waterways.
(4) To evaluate the importance of arboreal food chains in mangrove forests.
(5) To determine the details of (i) the trophic interactions between fish and prey items and (ii) the production ecology of fish in mangroves.

GEOGRAPHIC REGION: R
MAJOR DESCRIPTORS: Mangrove swamps/Invertebrates/Crustaceans/Trophodynamic cycle/
TAXONOMIC TERMS: Grapsidae; Sesarminae

[AIMS10202]

179 COASTAL TROPHODYNAMICS: Microbial processes and the role of benthic infauna in the carbon cycle and nutrient regeneration within mangroves.

June 1987 - June 1989

ORGANIZATION:
Australian Institute of Marine Science
PMB No. 3
MC Townsville,
Qld 4810.

PROJECT LEADERS:
Dr D. Alongi (077) 789211
Dr J. Tietjen (USA)

CONTACT OFFICER:
Dr D. Alongi

OBJECTIVE
To quantitatively determine the combined and separate roles of microbial processes and benthic infauna in nutrient turnover processes.

GEOGRAPHIC REGION: R
MAJOR DESCRIPTORS: Mangrove swamps/Bacteria/Benthos/Carbon cycle/
TAXONOMIC TERMS: Nematoda; Protozoa

[AIMS10201]

180 COMMUNITY BENTHIC PROCESSES: Grazing and related factors of influence.

June 1986 - June 1990

ORGANIZATION:
Australian Institute of Marine Science
PMB No. 3
MC Townsville,
Qld 4810.

PROJECT LEADERS:
Dr P. Sammarco (077) 789211
Dr M. Risk (Canada)

CONTACT OFFICER:
Dr P. Sammarco

OBJECTIVE
To study the effects of grazing and related ecological processes as influences of benthic community structure on coral reefs. Data will be examined with respect to cross-shelf and latitudinal trends and the set of physical, chemical, and biological factors of potential influence characteristic of each study area. Objects of the study will include internal and external bioerosion of scleractinian corals, and techniques will include X-ray radiography and stable isotope geochemistry.

GEOGRAPHIC REGION: R
MAJOR DESCRIPTORS: Reef fish/Grazing/Coral reefs/Bioerosion/Palaeo studies/

[AIMS20801]

181 COMMUNITY BENTHIC PROCESSES: Effects of grazing on benthos.

June 1986 - June 1989

ORGANIZATION:
Australian Institute of Marine Science
PMB No. 3
MC Townsville,
Qld 4810.

PROJECT LEADERS:
Dr P. Sammarco (077) 789211
Dr M. Riddle

CONTACT OFFICER:
Dr P. Sammarco

OBJECTIVE

To conclude studies into the activities and composition of diurnal and nocturnal grazers and soft bottom infauna on reefs using time-lapse cinematography.

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Reef fish/Grazing/Benthos/Feeding behaviour/

[AIMS20802]

182 COMMUNITY BENTHIC PROCESSES: Soft coral chemical ecology.

June 1986 - June 1989

ORGANIZATIONS:
Australian Institute of Marine Science
PMB No. 3
MC Townsville,
Qld 4810.
James Cook University of North Queensland
University of Alberta
Canada

PROJECT LEADERS:
Dr P. Sammarco (077) 789211
Dr J. Coll (JCU)
Dr P. Alino (JCU)
Dr P. Antonelli (Alberta)

CONTACT OFFICER:
Dr P. Sammarco

OBJECTIVE

To conclude the study of the chemical ecology of alcyonacean soft corals as it pertains to competition for space, allelopathy, defence mechanisms, morphology, toxicity, and toxicological effects on living tissue, particularly in scleractinian corals. The influences of biological and physical factors, including predation and light, in controlling competitive interactions will also be considered. Results of field and laboratory experiments will contribute to the construction of analytical mathematical models describing the system.

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Coral/Competitive behaviour/Resistance mechanisms/Defence mechanisms/

TAXONOMIC TERMS: Alcyonacea

[AIMS20803]

183 CONNECTIVITY IN MARINE SYSTEMS: A simulation study of *Acanthaster* dispersal.

June 1986 - June 1989

ORGANIZATIONS:
Australian Institute of Marine Science
PMB No. 3
MC Townsville,
Qld 4810.
Australian National University

PROJECT LEADERS:
Dr R. Reichelt (077) 789211
Dr R. Bradbury
Dr D. Green (ANU)

CONTACT OFFICER:
Dr R. Reichelt

OBJECTIVE

To evaluate competing hypotheses concerning the distribution of *Acanthaster planci* on the GBR, using a set of models ranging from non-spatial models, through models of starfish movement on single reefs to multi-reef models, towards an understanding of the dynamics of the Acanthaster phenomenon.

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Crown of thorns starfish/Coral reefs/Ecological distribution/Mathematical models/

TAXONOMIC TERMS: Acanthaster planci

[AIMS40302]

184 CORAL BIOGEOGRAPHY: Coral distribution analyses.

June 1986 - June 1989

ORGANIZATION:
Australian Institute of Marine Science
PMB No. 3
MC Townsville,
Qld 4810.

PROJECT LEADERS:
Dr J. Veron (077) 789211
Dr D. Potts (USA)

CONTACT OFFICER:
Dr J. Veron

OBJECTIVES

Compilation and analysis of data on the Indo-Pacific distribution of hermatypic Scleractinia.
All distribution records of hermatypic corals will be analysed for broad scale patterns and used for comparison with oceanographic data, the fossil record and evolutionary theory.

GEOGRAPHIC REGIONS: R,E,W,Z,I,P
MAJOR DESCRIPTORS: Coral/Geographical distribution/Biogeography/
TAXONOMIC TERMS: Scleractinia

[AIMS20201]

185 CORAL BIOGEOGRAPHY: Distribution patterns of Japanese corals.

June 1986 - June 1989

ORGANIZATION:
Australian Institute of Marine Science
PMB No. 3
MC Townsville,
Qld 4810.

PROJECT LEADERS:
Dr J. Veron (077) 789211
Dr M. Yamaguchi (Japan)

CONTACT OFFICER:
Dr J. Veron

OBJECTIVE

To complete a comparative study of distribution patterns in Japanese and Australian corals.

GEOGRAPHIC REGIONS: R,E,W,P
MAJOR DESCRIPTORS: Coral/Geographical distribution/
TAXONOMIC TERMS: Scleractinia

[AIMS20202]

186 CORAL CHRONOLOGIES/PALEOENVIRONMENTS: Isotopic studies in coral skeletons.

June 1986 - June 1989

ORGANIZATIONS:
Australian Institute of Marine Science
PMB No. 3
MC Townsville,
Qld 4810.
Australian National University

PROJECT LEADERS:
Dr P. Isdale (077) 789211
Dr A. Chivas (ANU)
Dr E. Druffel (USA)

CONTACT OFFICER:
Dr P. Isdale

OBJECTIVES

1. To derive isotopic signatures from coral cores to investigate past environments.
2. To attempt to validate radiometric techniques against core samples of known age.

GEOGRAPHIC REGION: R
MAJOR DESCRIPTORS: Carbon isotopes/Coral/Coral reefs/Temporal variations/Core analysis/
TAXONOMIC TERMS: Porites porites

[AIMS30203]

187 CORAL CHRONOLOGIES/PALEOENVIRONMENTS: Paleoclimatic studies using fluorescent band paleohydrology proxy records.

June 1989 - June 1991

ORGANIZATION:
Australian Institute of Marine Science
PMB No. 3
MC Townsville,
Qld 4810.

PROJECT LEADER:
Dr P. Isdale (077) 789211

OBJECTIVE
To use paleohydrological data from fluorescent band studies on corals to reconstruct several paleoclimatic parameters in river catchments of interest to paleohydrologists and paleoclimatologists.

GEOGRAPHIC REGION: R
MAJOR DESCRIPTORS: River discharge/Coral/Palaeoclimate/
TAXONOMIC TERMS: Porites porites

[AIMS30205]

188 CORAL CHRONOLOGIES/PALEOENVIRONMENTS: Biochemistry of fluorescence in massive corals.

June 1986 - June 1990

ORGANIZATION:
Australian Institute of Marine Science
PMB No. 3
MC Townsville,
Qld 4810.

PROJECT LEADERS:
Dr K. Boto (077) 789211
Dr P. Isdale

CONTACT OFFICER:
Dr K. Boto

OBJECTIVES
1. To investigate in detail the nature and levels of fluorescing compounds incorporated in coral skeletons and the relative contributions of terrestrial and marine inputs to observed skeletal phenomena.
2. To examine fluorescence as a possible means of identifying historical successions of plant communities in specified river catchments.
3. To investigate some other geo-biochemical signatures in coral skeletons (e.g. Red bands).

GEOGRAPHIC REGION: R
MAJOR DESCRIPTORS: Fluorescence/Coral/Palaeoecology/
TAXONOMIC TERMS: Porites porites

[AIMS30202]

189 CORAL CHRONOLOGIES/PALEOENVIRONMENTS: Measurement of terrestrial input to the inshore region using fluorescent bands in corals.

June 1986 - June 1991

ORGANIZATIONS:
Australian Institute of Marine Science
PMB No. 3
MC Townsville,
Qld 4810.
Queensland Water Resources Commission

PROJECT LEADERS:
Dr P. Isdale (077) 789211
Dr B. Stewart (QWRC)
Dr K. Tickle

CONTACT OFFICER:
Dr P. Isdale

OBJECTIVES
1. To quantify and calibrate fluorescent sequences in coral cores against hydrograph and other data in order to reconstruct paleohydrological events.
2. To investigate some aspects of recent inputs to the nearshore regions as a function of hydrological history.

GEOGRAPHIC REGION: R
MAJOR DESCRIPTORS: Coral/River discharge/Fluorimeters/Fluorescence spectroscopy/Core analysis/
TAXONOMIC TERMS: Porites porites

[AIMS30201]

190 CORAL COMMUNITY ECOLOGY: Geographical ecology of corals.

June 1986 - June 1991

ORGANIZATION:
Australian Institute of Marine Science
PMB No. 3
MC Townsville,
Qld 4810.

PROJECT LEADERS:
Dr T. Done (077) 789211
Dr J. Veron
Dr J. Pandolfi

CONTACT OFFICER:
Dr T. Done

OBJECTIVE
To document the zonation patterns, composition and structure of coral communities in a wide range of environments in order to understand the range of variability in coral communities and their major geographic and environmental correlates.

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Coral/Environmental effects/Community composition/Species diversity/

[AIMS20602]

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191 CORAL COMMUNITY ECOLOGY: Disturbance in coral communities.

June 1986 - June 1991

ORGANIZATION:
Australian Institute of Marine Science
PMB No. 3
MC Townsville,
Qld 4810.

PROJECT LEADERS:
Dr T. Done (077) 789211
Dr P. Dayton USA
Dr D. Potts USA

CONTACT OFFICER:
Dr T. Done

OBJECTIVE
To develop an understanding of the role of disturbances in structuring of coral communities by contrasting coral population performance in undisturbed habitats with that in habitats subjected to catastrophic disturbances of various types, including cyclones, outbreaks of crown-of-thorns starfish, and disease.

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Coral reefs/Hurricanes/Ecosystem disturbance/Biological damage/Crown of thorns starfish/

TAXONOMIC TERMS: Acanthaster planci

[AIMS20601]

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192 CORAL GROWTH, DENSITY AND CLIMATIC MODELLING: Density variation and climate.

June 1986 - June 1990

ORGANIZATION:
Australian Institute of Marine Science
PMB No. 3
MC Townsville,
Qld 4810.

PROJECT LEADERS:
Dr J. Lough (077) 789211
Dr D. Barnes
Dr B. Chalker

CONTACT OFFICER:
Dr J. Lough

OBJECTIVE
To understand which environmental variables are recorded by coral skeletal density so that records of such variables during the past several centuries can be obtained from very large colonies of *Porites*. Statistical analyses of density profiles across slabs cut from specimens of 3 species of *Porites* (*P. lobata*, *P. lutea* and *P. solida*) collected from shallow water on inshore, mid-shelf and shelf- edge reefs have begun.

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Coral/Environmental effects/Climatic data/

TAXONOMIC TERMS: Porites lobata; Porites lutea; Porites solida

[AIMS30102]

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193 CORAL GROWTH, DENSITY AND CLIMATIC MODELLING: Nature of the density bands in corals.

June 1986 - June 1989

ORGANIZATIONS:

Australian Institute of Marine Science
PMB No. 3
MC Townsville,
Qld 4810.

James Cook University of North Queensland

PROJECT LEADERS:

Dr D. Barnes (077) 789211
Dr B. Chalker
Dr C. Cuff (JCU)

CONTACT OFFICER:

Dr D. Barnes

OBJECTIVES

To understand the way in which the coral introduces density variations into its skeleton in order to understand both the causative environmental influences, and the most appropriate methods for interpreting and quantifying those influences from the density record.
Ongoing work aims to understand the nature, causes and possible periodicity of the fine banding in the skeletal architecture.

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Coral/Chemical properties/Physical properties/

[AIMS30103]

194 FISH COMMUNITY ECOLOGY: *Acanthaster* and fish communities.

June 1986 - June 1991

ORGANIZATIONS:

Australian Institute of Marine Science
PMB No. 3
MC Townsville,
Qld 4810.

Sea Research

PROJECT LEADERS:

Dr D. Williams (077) 789211
Dr A. Ayling

CONTACT OFFICER:

Dr D. Williams

OBJECTIVE

To ascertain the effects of *Acanthaster* outbreaks on the structure of fish communities.

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Reef fish/Community composition/Crown of thorns starfish/

TAXONOMIC TERMS: Acanthaster planci

[AIMS20701]

195 FISH COMMUNITY ECOLOGY: Fish recruitment.

June 1986 - June 1991

ORGANIZATIONS:

Australian Institute of Marine Science
PMB No. 3
MC Townsville,
Qld 4810.

Griffith University

University of Sydney

PROJECT LEADERS:

Dr D. Williams (077) 789211
Dr P. Doherty
Dr P. Sale

CONTACT OFFICER:

Dr D. Williams

OBJECTIVES

1. To examine stock and recruitment patterns of coral reef fishes between 17 and 23 degrees S. (Latitudinal and inter-annual variation in recruitment).
2. To monitor inter-annual variability of cross-shelf patterns of recruitment (longitudinal variation in recruitment).
3. To assess techniques of determining age structure of coral reef fishes as a tool for assessing the significance of interannual variability in recruitment.

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Reef fish/Recruitment/Stocks/Latitudinal variations/

[AIMS20702]

196 **FISH COMMUNITY ECOLOGY: Resource availability and evolutionary constraints.**

June 1986 - June 1989

ORGANIZATION:
Australian Institute of Marine Science
PMB No. 3
MC Townsville,
Qld 4810.

PROJECT LEADERS:
Dr D. Williams (077) 789211
Dr L. Kaufman (USA)

CONTACT OFFICER:
Dr D. Williams

OBJECTIVE
To determine the influence of resource availability and evolutionary constraints on among-reef distribution of planktivorous fish by studying comparative feeding ecology and jaw morphology of planktivorous fishes across the central GBR transect.

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Reef fish/Plankton feeders/Ecological distribution/Limiting factors/

[AIMS20703]

197 **FISH COMMUNITY ECOLOGY: Review of fish community ecology.**

June 1986 - June 1991

ORGANIZATIONS:
Australian Institute of Marine Science
PMB No. 3
MC Townsville,
Qld 4810.
Griffith University

PROJECT LEADERS:
Dr D. Williams (077) 789211
Dr P. Doherty

CONTACT OFFICER:
Dr D. Williams

OBJECTIVE
To synthesize the above and earlier studies into three major reviews: one of the geographical ecology of Great Barrier Reef fish communities (completed); one of spatial patterns and dynamics of coral reef fishes (book chapter in press), and another of replenishment (recruitment) of populations of coral reef fishes.

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Reef fish/Ecological distribution/Population structure/Recruitment/

[AIMS20704]

198 **FLUXES AND FLOWS IN MARINE SYSTEMS: Carbon flows in reef systems.**

June 1986 - June 1991

ORGANIZATION:
Australian Institute of Marine Science
PMB No. 3
MC Townsville,
Qld 4810.

PROJECT LEADERS:
Dr M. Pichon (077) 789211
Dr R. Reichelt
Dr R. Bradbury
Dr L. Montaggioni (La Reunion)

CONTACT OFFICER:
Dr M. Pichon

OBJECTIVE
To define the major pathways and quantify the fluxes of organic and inorganic carbon in the reef environment, towards the development of a predictive model of carbon flows in reef systems.

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Coral reefs/Carbon/Organic carbon/

[AIMS40601]

199 **FORCINGS OF MARINE SYSTEMS: Effects of the crown of thorns starfish on the Great Barrier Reef.**

June 1986 - June 1990

ORGANIZATIONS:
Australian Institute of Marine Science
PMB No. 3
MC Townsville,
Qld 4810.
University of Alberta
Canada
Australian National University
CSIRO

PROJECT LEADERS:
Dr R. Bradbury (077) 789211
Dr R. Reichelt
Dr P. Moran
Dr P. Antonelli (Alberta)
Dr D. Green (ANU)
Dr M. Dale (CSIRO)
Dr R. Ormond (UK)

CONTACT OFFICER:
Dr R. Bradbury

OBJECTIVE
To determine the effects of the phenomenon as an aperiodic forcing of the GBR systems, using a range of analytical and modelling strategies on an extensive database of the Acanthaster phenomenon, towards an understanding of the phenomenon at the scale of the whole Great Barrier Reef.

GEOGRAPHIC REGION: R
MAJOR DESCRIPTORS: Coral reefs/Mathematical models/Statistical models/Crown of thorns starfish/ Infestations/
TAXONOMIC TERMS: Acanthaster planci

[AIMS40403]

200 FOSSIL BIOTA: Submerged Halimeda banks.

June 1986 - June 1989

ORGANIZATIONS:
Australian Institute of Marine Science
PMB No. 3
MC Townsville,
Qld 4810.
Bureau of Mineral Resources, Geology and Geophysics
University of Queensland
Australian National University

PROJECT LEADERS:
Dr E. Drew (077) 789211
Dr M. Furnas
Dr E. Wolanski
Dr P. Davies (BMR)
Dr R. Orme (U Qld)
Dr K. Abel (ANU)

CONTACT OFFICER:
Dr E. Drew

OBJECTIVES
To study the fossil record of Halimeda banks and to determine the biological and physical parameters which control growth.
Holocene to Recent Halimeda banks, interspersed with Pleistocene coral outcrops, occur behind ribbon reefs of the northern GBR. They consist mainly of Halimeda fragments, may be up to 30 m thick, and are covered with luxuriant Halimeda meadows at30-45 m depth. They occur where tidal jets generate nutrient upwelling from below the mixed layer in the Coral Sea and may act as major nutrient sinks, with later release into the water column or incorporation into the sediment with organic carbon.
This project involves sediment chemistry and geochemistry (with possible significance for studies of mechanisms of hydrocarbon generation) as well as Halimeda productivity, calcification and taxonomy. The latter will assist with analysis of paleoenvironments as indicated by species composition down cores to at least 5000 years b.p.

STATUS

Completed Project - This project will remain in the computerized Register for another 5 years but will not be included in future issues of the Compendium.

GEOGRAPHIC REGION: R
MAJOR DESCRIPTORS: Sediment composition/Sediment distribution/Calcification/Biological production/Palaeoenvironments/Algae/
TAXONOMIC TERMS: Halimeda

[AIMS20101]

201 HETEROTROPHIC/AUTOTROPHIC BALANCES: Distribution patterns and nutrition.

June 1987 - June 1990

ORGANIZATION:
Australian Institute of Marine Science
PMB No. 3
MC Townsville,
Qld 4810.

PROJECT LEADERS:
Dr C. Wilkinson (077) 789211
Dr R. Reichelt
Dr T. Done

CONTACT OFFICER:
Dr C. Wilkinson

OBJECTIVE
To determine whether intra-reef and cross-shelf distribution patterns of corals, sponges and clams are related to a model of phototrophic and heterotrophic nutrition.

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Coral reefs/Sponges/Ecological distribution/Heterotrophy/Autotrophy/Bivalves/

TAXONOMIC TERMS: Porifera

[AIMS21202]

202 HETEROTROPHIC/AUTOTROPHIC BALANCES: Sponge nutrition.

June 1986 - June 1989

ORGANIZATION:
Australian Institute of Marine Science
PMB No. 3
MC Townsville,
Qld 4810.

PROJECT LEADER:
Dr C. Wilkinson (077) 789211

OBJECTIVE
Studies on the nutrition of marine sponges will be concluded and will include publication of previous productivity/respiration studies across the continental shelf plus estimates of pumping rates and filtration efficiencies in animals with and without algal symbionts.

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Sponges/Symbionts/Primary production/

TAXONOMIC TERMS: Porifera

[AIMS21203]

203 HETEROTROPHIC/AUTOTROPHIC BALANCES: Variability of the nutrition spectrum.

June 1986 - June 1989

ORGANIZATIONS:
Australian Institute of Marine Science
PMB No. 3
MC Townsville,
Qld 4810.
CSIRO, Division of Oceanography

PROJECT LEADERS:
Dr C. Wilkinson (077) 789211
Dr D. Klumpp
Dr R. Reichelt
Dr P. Nichols (CSIRO)
Dr T. Front (USA)
Dr D. Manahan (USA)
Dr K. Sebens (USA)

CONTACT OFFICER:
Dr C. Wilkinson

OBJECTIVE
The balance of nutrition between phototrophic and heterotrophic (dissolved and particulate organic matter, zooplankton) sources will be examined in a range of coral, sponge and clam species to determine the range of variability of the nutritional spectrum.

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Sponges/Coral/Autotrophy/Heterotrophy/Bivalves/

TAXONOMIC TERMS: Porifera

[AIMS21201]

204 **MANGROVE FOREST RESOURCES: Biotic and abiotic factors affecting mangrove species distribution and forest structure.**

June 1986 - June 1989

ORGANIZATION:
Australian Institute of Marine Science
PMB No. 3
MC Townsville,
Qld 4810.

PROJECT LEADERS:
Dr B. Clough (077) 789211
Dr T. Smith

CONTACT OFFICER:
Dr B. Clough

OBJECTIVE
To determine growth hormone effects on propagule viability and growth.

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Mangrove swamps/Abiotic factors/Biotic factors/Satellite sensing/ Biogeography/

[AIMS10103]

205 **MANGROVE FOREST RESOURCES: Edaphic factors in relation to primary production.**

June 1986 - June 1990

ORGANIZATIONS:
Australian Institute of Marine Science
PMB No. 3
MC Townsville,
Qld 4810.
Griffith University

PROJECT LEADERS:
Dr K. Boto (077) 789211
Dr B. Clough
Dr P. Saffigna (Griffith)

CONTACT OFFICER:
Dr K. Boto

OBJECTIVES
1. To determine the extent of trace element deficiencies in Australian mangrove forests.
2. To determine the factors governing mangrove nitrogen uptake over a wide range of species and soil condition.

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Mangrove swamps/Trace elements/Nitrogen cycle/Biogeography/

[AIMS10102]

206 **MANGROVE FOREST RESOURCES: Photosynthesis, primary production and productivity modelling.**

June 1986 - June 1991

ORGANIZATION:
Australian Institute of Marine Science
PMB No. 3
MC Townsville,
Qld 4810.

PROJECT LEADER:
Dr B. Clough (077) 789211

OBJECTIVE
To establish a working model relating mangrove forest primary production to standard climatic and other environmental factors.

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Mangrove swamps/Photosynthesis/Primary production/Biogeography/

[AIMS10101]

207 **MICRO/MESO-SCALE DISPERSAL: Coral recruitment.**

June 1986 - June 1989

ORGANIZATION:
Australian Institute of Marine Science
PMB No. 3
MC Townsville,
Qld 4810.

PROJECT LEADERS:
Dr P. Sammarco (077) 789211
Dr J. Andrews

CONTACT OFFICER:
Dr P. Sammarco

OBJECTIVE

To study small-scale distribution patterns of dispersal and recruitment in scleractinian corals on and around a single isolated coral reef. This study is designed to determine whether reefs are primarily self-seeded with respect to corals or strongly inter-dependent. The biological results of field experiments will be analyzed in concern with results of physical oceanographic field data collected simultaneously and modelled to help explain the observed patterns and physical and biological factors influencing them. The study will also attempt to determine whether coral growth may be readily initiated from the shelf floor.

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Coral/Recruitment/Dispersion/Growth/

[AIMS20402]

208 MICRO/MESO-SCALE DISPERSAL: Cross-shelf transplant experiment.

June 1986 - June 1989

ORGANIZATION:
Australian Institute of Marine Science
PMB No. 3
MC Townsville,
Qld 4810.

PROJECT LEADER:
Dr P. Sammarco (077) 789211

OBJECTIVE

To conclude study of the distribution patterns of coral recruitment across the central Great Barrier Reef region and undertake an experimental assessment of factors controlling the observed patterns. The object of this experiment is to determine whether recruitment patterns are determined primarily by limited geographic dispersal, local environmental factors influencing post-settlement natural selection, or both.

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Coral/Coral reefs/Geographical distribution/Recruitment/Transplantation/

[AIMS20401]

209 MICRO/MESO-SCALE DISPERSAL: Larval fish dispersal.

June 1986 - June 1989

ORGANIZATION:
Australian Institute of Marine Science
PMB No. 3
MC Townsville,
Qld 4810.

PROJECT LEADERS:
Dr D. Williams (077) 789211
Dr J. Andrews

CONTACT OFFICER:
Dr D. Williams

OBJECTIVE

To produce a meso-scale model of larval fish dispersal in the central GBR.

METHODOLOGY

This will use a vertically stratified numerical model of shelf circulation together with data on taxon-specific and day-night patterns in the vertical distribution of fish larvae in inter-reefal waters.

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Fish larvae/Dispersion/Vertical distribution/Diurnal variations/ Coral reefs/

[AIMS20403]

210 MICRO-SCALE REEF WATER DYNAMICS: Coral spawning experiment.

June 1986 - June 1991

ORGANIZATIONS:
Australian Institute of Marine Science
PMB No. 3
MC Townsville,
Qld 4810.
James Cook University of North Queensland

PROJECT LEADERS:
Dr E. Wolanski (077) 789211
Dr D. Burrage
Dr M. Pichon
Dr R. Falconer (UK)
Dr W. Hamner (USA)
Dr T. Lee (USA)
Dr J. Nihoul (Belgium)

CONTACT OFFICER:
Dr E. Wolanski

OBJECTIVE
Field studies and numerical models will be used to analyse and explain communication between reefs and patchiness in inter-reef water. These models include completed studies of the island wake effect and the tidal jet effect. Field studies will include study of coral spawn dispersal.

GEOGRAPHIC REGION: R
MAJOR DESCRIPTORS: Coral reefs/Coral/Spawning/Tidal effects/Dispersion/

[AIMS20501]

211 MICRO-SCALE REEF WATER DYNAMICS: Tidal jets and Halimeda banks.

June 1986 - June 1989

ORGANIZATIONS:
Australian Institute of Marine Science
PMB No. 3
MC Townsville,
Qld 4810.
Australian Defence Force Academy
Australian National University

PROJECT LEADERS:
Dr E. Drew (077) 789211
Dr E. Wolanski
Dr M. Furnas
Dr P. Holloway (ADFA)
Dr K. Abel (ANU)

CONTACT OFFICER:
Dr E. Drew

OBJECTIVE
To conclude a study of the effects of forced upwelling of nutrient-rich waters on Halimeda banks.

GEOGRAPHIC REGION: R
MAJOR DESCRIPTORS: Upwelling/Tidal effects/Algae/
TAXONOMIC TERMS: Halimeda

[AIMS20504]

212 POPULATION GENETICS AND EVOLUTION IN CORALS: Genetics and demography of *Porites*.

June 1986 - June 1991

ORGANIZATION:
Australian Institute of Marine Science
PMB No. 3
MC Townsville,
Qld 4810.

PROJECT LEADERS:
Dr T. Done (077) 789211
Dr J. Veron
Dr J. Pandolfi
Dr D. Potts (USA)

CONTACT OFFICER:
Dr T. Done

OBJECTIVE
To determine the genetic and demographic structures of populations of *Porites* corals in environments encompassing a range of disturbance regimes and in locations of varying degrees in isolation from other reefs. The results of this study will help clarify the merits of several existing models of coral evolution and biogeography. They will also contribute to the understanding of local scale population dynamics of one of the major builders of Indo- Pacific coral reefs.

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Coral/Genetics/Population structure/
TAXONOMIC TERMS: Porites

[AIMS20904]

213 PRIMARY PRODUCTIVITY AND CALCIFICATION ON REEF AND IN REEF ORGANISMS: Coral primary production and calcification.

June 1986 - June 1990

ORGANIZATION:
Australian Institute of Marine Science
PMB No. 3
MC Townsville,
Qld 4810.

PROJECT LEADER:
Dr B. Chalker (077) 789211

OBJECTIVES
1. To study primary production, calcification in reef organisms, particularly corals.
2. To examine carbon metabolism and photo-adaptation to solar visible and ultraviolet light.

GEOGRAPHIC REGION: R
MAJOR DESCRIPTORS: Coral/Calcification/Primary production/

[AIMS21301]

214 PRIMARY PRODUCTIVITY AND CALCIFICATION ON REEF AND IN REEF ORGANISMS: Simultaneous measurements of CO_2 and carbonate.

June 1988 - June 1991

ORGANIZATION:
Australian Institute of Marine Science
PMB No. 3
MC Townsville,
Qld 4810.

PROJECT LEADERS:
Dr W. Dunlap (077) 789211
Dr D. Barnes
Dr B. Chalker

CONTACT OFFICER:
Dr W. Dunlap

OBJECTIVE
Direct instrumental methodology will be developed for the measurement of seawater CO_2 and/or carbonate. This will allow simultaneous measurement of photosynthesis, respiration and calcification. This project is dependent on the purchase of a Fourier transform infra-red spectrophotometer.

GEOGRAPHIC REGION: R
MAJOR DESCRIPTORS: Coral reefs/Carbon dioxide/Carbonates/

[AIMS21302]

215 REEF PHOTOBIOLOGY: Biochemistry of UV blocking substances.

June 1986 - June 1991

ORGANIZATION:
Australian Institute of Marine Science
PMB No. 3
MC Townsville, Qld 4810

PROJECT LEADERS:
Dr B. Chalker (077) 789211
Dr W. Dunlap

CONTACT OFFICER:
Dr B. Chalker

OBJECTIVE
To study the ecological and biochemical roles of UV blocking substances, found in corals, and in many other organisms occupying shallow reefal environments.

GEOGRAPHIC REGION: R
MAJOR DESCRIPTORS: Coral reefs/Ultraviolet radiation/Coral/Biochemistry/

[AIMS30301]

216 REEF PHOTOBIOLOGY: Synthetic chemistry of UV blocking substances.

June 1986 - June 1991

ORGANIZATIONS:
Australian Institute of Marine Science
PMB No. 3
MC Townsville,
Qld 4810.
ICI Australia

PROJECT LEADERS:
Dr W. Dunlap (077) 789211
Dr G. Bird (ICI)
Dr M. Nearn (ICI)
Dr D. Berryman (ICI)

CONTACT OFFICER:
Dr W. Dunlap

OBJECTIVE
Synthesis of UV-B absorbing compounds to exemplify provisional patent PH5148 (March, 1986) which is developed in Institute provisional patent P11625 (April, 1987) and a joint AIMS/ICI provisional patent (PH8208;September, 1986) for Australian and international patents applications 1987. Initiate new patent applications by research agreement with ICI Australia arising from new natural products obtained. Institute provisional patent P1-1625 is now registered (28 April 1988) as a complete Australian patent specification.

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Ultraviolet radiation/Aquatic drugs/

[AIMS30302]

217 REEF TROPHODYNAMICS: Determinants of structure of turf algal communities.

June 1987 - June 1990

ORGANIZATION:
Australian Institute of Marine Science
PMB No. 3
MC Townsville,
Qld 4810.

PROJECT LEADERS:
Dr C. Johnson (077) 789211
Dr D. Klumpp

CONTACT OFFICER:
Dr C. Johnson

OBJECTIVE
To investigate the mechanisms that govern the structure of epilithic algal communities, and to compare the productivity of turf algal assemblages of different community composition.

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Algae/Community composition/Coral reefs/Infestations/Crown of thorns starfish/

[AIMS21107]

218 REEF TROPHODYNAMICS: Benthic trophic processes.

June 1986 - June 1991

ORGANIZATIONS:
Australian Institute of Marine Science
PMB No. 3
MC Townsville,
Qld 4810.
University of Sydney
CSIRO, Division of Oceanography
James Cook University of North Queensland

PROJECT LEADERS:
Dr D. Klumpp (077) 789211
Dr D. Alongi
Dr M. Riddle
Dr B. Bayne (UK)
Dr P. Dayton (USA)
Dr J. Hansen (U Syd)
Dr P. Nichols (CSIRO)
Dr J.S. Lucas (JCU)

CONTACT OFFICER:
Dr D. Klumpp

OBJECTIVE
To measure composition, origin and fate of detritus with emphasis on bivalve molluscs in the lagoon of Davies Reef.

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Detritus/Trophic relationships/Benthos/Bivalves/

[AIMS21105]

219 **REEF TROPHODYNAMICS: Environmental factors controlling epilithic algal community (EAC) productivity. productivity.**

June 1988 - June 1989

ORGANIZATION:
Australian Institute of Marine Science
PMB No. 3
MC Townsville,
Qld 4810.

PROJECT LEADERS:
Dr D. Klumpp (077) 789211
Dr R. Carpenter (USA)
Dr N. Polunin (UK)

CONTACT OFFICER:
Dr D. Klumpp

OBJECTIVE
To investigate the factors controlling algal productivity with initial emphasis on the relationship between grazer activity and algal photosynthesis and productivity.

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Algae/Biological production/Grazing/Herbivorous fish/Photosynthesis/

[AIMS21104]

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220 **REEF TROPHODYNAMICS: Nutritional ecology of herbivorous reef fish.**

June 1986 - June 1991

ORGANIZATION:
Australian Institute of Marine Science
PMB No. 3
MC Townsville,
Qld 4810.

PROJECT LEADERS:
Dr D. Klumpp (077) 789211
Dr N. Polunin (UK)
Dr Brothers (USA)

CONTACT OFFICER:
Dr D. Klumpp

OBJECTIVE
To measure feeding rate and behaviour, food absorption efficiency, and growth (from field tagging and otolith ageing) of reef fish grazers and to relate this to algal availability and productivity on reefs. Long-term aims are to assess ecological efficiency of major fish grazers and their contribution to detrital pathways.

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Reef fish/Herbivorous fish/Feeding behaviour/Food conversion/ Grazing/

[AIMS21103]

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221 **REEF TROPHODYNAMICS: Patterns in productivity of epilithic algal communities (EAC).**

June 1986 - June 1989

ORGANIZATION:
Australian Institute of Marine Science
PMB No. 3
MC Townsville,
Qld 4810.

PROJECT LEADER:
Dr D. Klumpp (077) 789211

OBJECTIVE
To conclude studies of temporal and spatial patterns in the productivity of epilithic algae.

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Algae/Biological production/Temporal variations/Spatial variations/

[AIMS21101]

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222 **REEF TROPHODYNAMICS: Productivity model of epilithic algae.**

June 1988 - June 1989

ORGANIZATION:
Australian Institute of Marine Science
PMB No. 3
MC Townsville,
Qld 4810.

PROJECT LEADERS:
Dr E. Drew (077) 789211
Dr D. Klumpp

CONTACT OFFICER:
Dr E. Drew

OBJECTIVE

To combine realistic computer simulations of annual irradiance variations with known algal P-I characteristics of various epilithic and macro-algae in order to predict daily, seasonal and annual productivity potential.

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Algae/Biological production/Prediction/

[AIMS21106]

223 STRUCTURE OF MARINE SYSTEMS: A nitrogen budget for the north east Queensland shelf.

June 1986 - June 1991

ORGANIZATION:

Australian Institute of Marine Science
PMB No. 3
MC Townsville,
Qld 4810.

PROJECT LEADERS:

Dr M. Furnas (077) 789211
Dr J. Andrews (077) 789211

CONTACT OFFICER:

Dr M. Furnas

OBJECTIVE

To develop a quantitative budget for water column nitrogen pools and fluxes in the central region of the GBR, using oceanographic data collected in the central GBR, previously published data from the GBR and elsewhere and the results of experimental work, towards an understanding of water column nitrogen dynamics in tropical shelf ecosystems.

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Water column/Coral reefs/Nitrogen cycle/Tropical oceanography/Shelf dynamics/

[AIMS40201]

224 STRUCTURE OF MARINE SYSTEMS: Distribution and productivity of phytoplankton in coastal margins of the Coral Sea.

June 1987 - June 1990

ORGANIZATION:

Australian Institute of Marine Science
PMB No. 3
MC Townsville,
Qld 4810.

PROJECT LEADERS:

Dr M. Furnas (077) 789211
Dr J. Andrews
Dr D. Burrage

CONTACT OFFICER:

Dr M. Furnas

OBJECTIVE

To obtain a modern regional estimate of phytoplankton biomass and productivity distributions in the coastal margins of the Coral Sea, using the results of phytoplankton biomass and productivity surveys in the central GBR and Coral Sea together with similar proposed surveys in the Gulf of Papua and a long the Papuan Barrier Reef, towards an understanding of the dynamics of oceanic primary production in tropical regions.

GEOGRAPHIC REGIONS: R,Z

MAJOR DESCRIPTORS: Tropical oceanography/Coral reefs/Phytoplankton/Biomass/Coastal zone/

[AIMS40202]

225 STRUCTURE OF MARINE SYSTEMS: Remote sensing of marine systems.

June 1986 - June 1989

ORGANIZATIONS:
Australian Institute of Marine Science
PMB No. 3
MC Townsville,
Qld 4810.
CSIRO
Great Barrier Reef Marine Park Authority

PROJECT LEADERS:
Dr R. Reichelt (077) 789211
Dr R. Bradbury
Dr P. Moran
Dr D. Jupp (CSIRO)
Dr D. Kuchler (CSIRO)
Dr R. Kenchington (GBRMPA)

CONTACT OFFICER:
Dr R. Reichelt

OBJECTIVE
To develop standardized ground truth procedures for Landsat imagery in shallow marine systems, using the Institute's microBRIAN facility, towards an enhancement of the interpretation of such imagery.

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Coral reefs/Environmental monitoring/Satellite sensing/

[AIMS40207]

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226 STRUCTURE OF MARINE SYSTEMS: Study of techniques for the modelling of marine ecosystems.

June 1986 - June 1989

ORGANIZATION:
Australian Institute of Marine Science
PMB No. 3
MC Townsville,
Qld 4810.

PROJECT LEADERS:
Dr R. Reichelt (077) 789211
Dr R. Bradbury
Dr W. Greve (FRG)
Dr P. Hogeweg (Netherlands)

CONTACT OFFICER:
Dr R. Reichelt

OBJECTIVE
To examine the strengths and weaknesses of various techniques for modelling marine ecosystems, drawing on modelling techniques and data sets from both Australia and Germany, towards the development of a robust protocol for modelling marine ecosystems, particularly those of the Great Barrier Reef.

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Mathematical models/Ecosystems/

[AIMS40208]

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227 VARIABILITY IN MARINE SYSTEMS: Variability in large marine ecosystems.

June 1986 - June 1989

ORGANIZATIONS:
Australian Institute of Marine Science
PMB No. 3
MC Townsville,
Qld 4810.
Victorian Institute of Marine Sciences
Australian Museum

PROJECT LEADERS:
Dr R. Bradbury (077) 789211
Dr R. Reichelt
Dr L.S. Hammond (VIMS)
Dr A. Jones (Museum)

CONTACT OFFICER:
Dr R. Bradbury

OBJECTIVE
To complete the investigation of the patterns and scales of variability of these systems in space and time, using data sets from different large marine ecosystems, towards an understanding of the impact of variability on the structure and dynamics of large marine ecosystems.

GEOGRAPHIC REGIONS: R,B

MAJOR DESCRIPTORS: Marine ecology/Spatial variations/Temporal variations/Ecosystems/

[AIMS40106]

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228 Biogeography and ecology of northern Great Barrier Reef islands.

February 1979 -

ORGANIZATIONS:
Bond University, Centre for Environmental Management
Private Bag 10
Gold Coast, Qld 4217
University of New England, Department of Ecosystem Management

PROJECT LEADER:
Prof R.C. Buckley (075) 951111

EXPENDITURE:
$100,000 (all years)

MANPOWER:
0.30 (this year), 2.00 (all years)

EXTERNAL SUPPORT:
AIMS (Boat time and facilities, 1979)
CSIRO (Research fellowship Dr Buckley, 1979)
Department of Administrative Services, Survey Division (Aerial photography, 1979-1982)

OBJECTIVE

Describe, map and inventory the geomorphology, soils, vegetation and fauna of reef islands within the Great Barrier Reef province north of Lizard Island, and interpret floristic pattern in terms of the habitat unit model of island biogeography.

METHODOLOGY

Inventories of June 1979 and December 1979 from Australian Institute of Marine Science. Experimental work 1979- 81 at Lizard Island Research Station. Aerial photography (1:3000 colour) by Department of Administrative Services, Brisbane, completed 1982.

STATUS

Biogeographic data submitted for journal publication. Completing final monograph for publication in Monographiae Biologicae series.

CO-ORDINATION WITH OTHER PROJECTS

Data provided to Queensland National Parks and Wildlife Service and to Division of National Mapping as requested at intervals.

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Barrier islands/Biogeography/Ecological associations/Geomorphology/Inventories/Coral reefs/

[BONDU-001]

229** Reproductive biology and post-nesting migration of the flatback turtle *Chelonia depressa* .

November 1979 -

ORGANIZATION:
Capricornia Institute of Advanced Education
Department of Biology,
Rockhampton, Qld 4700

PROJECT LEADER:
Dr C.J. Parmenter (079) 361177 Ext 322

EXPENDITURE:
$2,500 (this year), $18,000 (all years)

MANPOWER:
0.50 (this year), 4.00 (all years)

EXTERNAL SUPPORT:
Queensland National Parks and Wildlife Service. (Equipment loan and logistics assistance.)

OBJECTIVES

To determine reproductive parameters of fecundity (intra- and inter- season), egg and hatchling mortality at the major eastern Queensland rookeries of *Chelonia depressa* .
To accumulate information on the post-nesting migration of females from these major rookeries.
To conduct annual monitoring of rookery cohort sizes.

METHODOLOGY

Research teams of student volunteer assistants monitor up to three rookeries simultaneously in Dec/ Jan. Turtles are tagged and all nesting beach activity recorded in standardised format.

STATUS

Seven seasons data have been collected. Numerous long distance post-nesting recaptures (including some that subsequently returned to their respective rookeries in later seasons) have allowed the refutation of previous speculations on the reproductive biology of this species.

CO-ORDINATION WITH OTHER PROJECTS

Marine Turtle Research Project of the Queensland National Parks and Wildlife Service.

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Reptiles/Population dynamics/Reproduction/Reproductive behaviour/

TAXONOMIC TERMS: Chelonia depressa

[CIAE—001]

230 Development of monoclonal antibodies against larvae of *Acanthaster planci*.

October 1986 - October 1988

ORGANIZATION:

Deakin University, Division of Biological and Health Sciences
Victoria, 3217

PROJECT LEADERS:

Dr P.J. Hanna (052) 471394
Dr V. Lee
Dr B. Richardson

CONTACT OFFICER:

Dr P.J. Hanna

EXPENDITURE:

$1,000 (this year), $1,000 (all years)

MANPOWER:

0.09 (this year)

EXTERNAL SUPPORT:

COTSAC - $16,078

OBJECTIVE

The main objective of the study was to produce monoclonal antibodies (mAb's) against larval surface antigens of the crown-of-thorns starfish. The mAb's would then be used to detect, isolate and characterize the surface antigens of this species. These surface markers could be used in taxonomic, developmental and food chain studies, as well as detection of crown-of-thorns larvae in field samples.

METHODOLOGY

Production of mAb's is initiated by repeated injections of intact larvae into Balb/c mice. Spleen cells are then fused with mouse myeloma cells, and following selection and repeated cloning, antibody producing clones isolated. The antibody produced by each clone is tested for reactivity with larval surface antigenic components and then screened for cross-reactivity to other species. If found to be specific, a marker antigen can then be used in taxonomy, as well as in developmental and food chain studies. Field trials are now planned.

STATUS

Currently at the stage of isolation of antibody producing clones and characterization of the antibody produced by each clone.

CO-ORDINATION WITH OTHER PROJECTS

Project is part of the AIMS COTSAR project led by Dr Peter Moran.

GEOGRAPHIC REGIONS: R,Z

MAJOR DESCRIPTORS: Antibodies/Biotechnology/Larvae/Crown of thorns starfish/

TAXONOMIC TERMS: Acanthaster planci

[DEAKIN004]

231 A multi-disciplinary pilot study of Hayman Island.

October 1988 -

ORGANIZATIONS:

Great Barrier Reef Marine Park Authority
PO Box 1379
Townsville, Qld 4810

James Cook University of North Queensland
Post Office
James Cook University, Qld 4811

University of Queensland, Department of Chemical Engineering
St Lucia, Qld 4067

PROJECT LEADERS:

Ms C. Baldwin (077) 818811
Mr R. van Woesik (077) 814111
Dr P. Bell (07) 3772333

CONTACT OFFICER:

Ms C. Baldwin

EXPENDITURE:

$22,458 (this year), $2,000 (all years)

OBJECTIVES

1. To define hydrodynamic patterns around Hayman Island using fluorescent dyes. This will allow the examination of the direction of sewerage dispersion relative to tide and wind, and subsequently choose sites for water quality analysis.
2. To design and undertake an extensive water sampling program at various stages in the tidal cycle. This will provide a base study for comparison with other islands and later studies.
3. To establish and re- examine permanent sites on Hayman Island fringing reefs, in order to assess spatial and temporal changes in benthic and fish communities.
4. To obtain several shallow cores of specific *Porites* coral species at various sites. Recent growth rates will be determined for each coral, and comparative growth rates from corals at different distances from the sewerage outlet can be analysed.

LOCALITY: Hayman Island

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Islands/Biota/Biological surveys/Water analysis/Environmental impact/Coral/Sewage disposal/

TAXONOMIC TERMS: Porites

[GBRMPA200]

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232 Abundance and distribution patterns of *Acanthaster planci* on the Great Barrier Reef.

June 1986 -

ORGANIZATIONS:

Great Barrier Reef Marine Park Authority
PO Box 1379
Townsville, Qld 4810

Sea Research (Subcontract)
PMB 1
Daintree, Qld 4873

PROJECT LEADERS:

Dr L. Zann (077) 818811
Dr A.M. Ayling (070) 986118

CONTACT OFFICER:

Dr L. Zann

EXPENDITURE:

$3,000 (all years)

OBJECTIVE

To compare manta tow estimates of crown of thorns starfish with that collected from intensive search transect counts using SCUBA.

METHODOLOGY

The densities of crown of thorns starfish were estimated on selected reefs using replicate swim transects. These were compared with estimates by the AIMS/Commonwealth Community Employment Program Crown of Thorns Survey which used a manta tow technique. The two techniques are analysed and compared.

STATUS

All surveys completed. Report in preparation.

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Crown of thorns starfish/Biogeography/Population density/Biological sampling/

TAXONOMIC TERMS: Acanthaster planci

[GBRMPA174]

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233 Coral health: evaluation of a rapid test to measure depletion in energy reserves in hard corals, and its applicability to reef monitoring.

April 1989 - June 1989

ORGANIZATION:

Great Barrier Reef Marine Park Authority
PO Box 1379
Townsville, Qld 4810

PROJECT LEADER:

Dr V. Harriott (077) 818811

EXPENDITURE:

$12,000 (this year), $12,000 (all years)

OBJECTIVES

1. To test the effectiveness of the method described by Stimson to measure changes in the lipid reserves of Great Barrier Reef corals.
2. To measure *in situ* lipid content of a number of species of Great Barrier Reef corals at several sites and depths.

3. To compare results of analysis of coral "health" made by lipid analysis with results of more established coral respirometry. Results of lipid analysis are integrated over days or weeks, while respirometry involves runs of 12-48 hours. Respirometry does not take into account the potential energy source of externally acquired food.
4. To measure changes in lipid reserves under controlled conditions to determine whether depletion of lipids is followed by death, and at what time inverval.
5. To test variables (light levels, external food and sediment fallout) and ascertain levels at which stress is detected in corals. The threshold levels for the variables will depend on the species and also on the conditions at the collection site.

STATUS

Experimental work has been completed at the Great Barrier Reef Aquarium in Townsville and a report submitted.

Completed Project - This project will remain in the computerized Register for another 5 years but will not be included in future issues of the Compendium.

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Coral reefs/Coral/Lipids/Metabolism/Energy flow/

[GBRMPA187]

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234 **Coral recruitment on fringing reefs near Cape Tribulation.**

December 1985 -

ORGANIZATIONS:

Great Barrier Reef Marine Park Authority
PO Box 1379
Townsville Qld 4810

Reef Research and Information Services
(Subcontract)
PO Box 5348
Townsville MC, Qld 4810

PROJECT LEADERS:

Ms C. Baldwin (077) 818811
Mr D. Fisk (077) 726519

CONTACT OFFICER:

Ms C. Baldwin

EXPENDITURE:

$2,600 (this year), $15,300 (all years)

OBJECTIVES

To determine coral recruitment patterns in the vicinity of Cape Tribulation.
To assess whether sediment runoff from Cape Tribulation Road has affected recruitment.

METHODOLOGY

Assessment will be made of the composition of spat recruitment on the settlement plates at sites adjacent to the Cape Tribulation Road. Grids surveyed every six months.

STATUS

Final report received; to be published by GBRMPA.

Completed Project - This project will remain in the computerized Register for another 5 years but will not be included in future issues of the Compendium.

LOCALITY: Cape Tribulation

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Construction/Runoff/Environmental impact/Fringing reefs/Recruitment/ Coral/

[GBRMPA148]

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235 **Hard coral regeneration on Green Island Reef.**

November 1988 -

ORGANIZATIONS:

Great Barrier Reef Marine Park Authority
PO Box 1379
Townsville, Qld 4810

Reef Research and Information Services
PO Box 5348
Townsville MC, Qld 4810

PROJECT LEADERS:

Dr B. Lassig (077) 818811
Mr D.A. Fisk (077) 726519

CONTACT OFFICER:

Dr B. Lassig

EXPENDITURE:

$5,918 (this year), $5,918 (all years)

OBJECTIVES

1. To collect all settlement plates which were deployed in November 1988, and to put out a subset of these as replacements for the winter period at Green Island only.
2. To analyse as many as possible of the plates (approximately 1/2 of the total) in the time available.

STATUS

This project continues earlier work by Fisk and Harriott on hard coral regeneration.
A continuaton of analysis of stations commenced in a study on methods for re-establishment of hard corals in denuded reef systems. (GBRMPA101)

LOCALITY: Green Island
GEOGRAPHIC REGION: R
MAJOR DESCRIPTORS: Coral/Regeneration/Coral reefs/

[GBRMPA192]

236 Monitoring juvenile crown-of-thorns starfish *Acanthaster planci* on Green Island.

April 1989 -

ORGANIZATIONS:

Great Barrier Reef Marine Park Authority
PO Box 1379
Townsville, Qld 4810

Reef Research and Information Services
PO Box 5348
Townsville MC, Qld 4810

PROJECT LEADERS:

Dr L. Zann (077) 818811
Mr D.A. Fisk (077) 726519

CONTACT OFFICER:

Dr L. Zann

EXPENDITURE:

$14,751 (this year)

OBJECTIVES

1. Search for newly-settled (0+ year) starfish in defined habitats while stratifying for high and low hard coral cover areas, and for shallow (reef flat) and deeper (slope) habitats.
2. Search in high coral cover areas only, for older (1+ year) individuals which are obligatory coral feeders, so as to establish the density of this population in areas where food is most abundant. Also, regular monitoring of the population and the areas of best coral cover will be proposed for future years.

CO-ORDINATION WITH OTHER PROJECTS

Co-ordinated with studies at Green Island on biota, hard corals, benthos and water quality.

LOCALITY: Green Island
GEOGRAPHIC REGION: R
MAJOR DESCRIPTORS: Crown of thorns starfish/Juveniles/Monitoring/Population dynamics/Coral/
TAXONOMIC TERMS: Acanthaster planci

[GBRMPA201]

237 Monitoring of Cape Tribulation fringing reefs.

December 1985 -

ORGANIZATIONS:

Great Barrier Reef Marine Park Authority
PO Box 1379
Townsville Qld 4810

Sea Research (Subcontract)
PMB 1
Daintree, Qld 4873

PROJECT LEADERS:

Ms C. Baldwin (077) 818811
Dr A.M. Ayling (070) 986118

CONTACT OFFICER:

Ms C. Baldwin

EXPENDITURE:

$4,000 (this year), $87,500 (all years)

OBJECTIVES

To determine and monitor biological patterns and processes in the vicinity of Cape Tribulation.
To assess whether sediment runoff from the Cape Tribulation road has affected these patterns.

METHODOLOGY

Survey by line transects of fringing reefs adjacent to both established and newly constructed sections of the road.

STATUS

Biological processes monitored through two wet seasons. Project continuing with one survey per year.

LOCALITY: Cape Tribulation

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Biological surveys/Runoff/Environmental impact/Construction/Fringing reefs/

[GBRMPA147]

238* **Potential human causes of *Acanthaster planci* aggregations in the South Pacific.**

May 1986 - December 1990

ORGANIZATIONS:

Great Barrier Reef Marine Park Authority
PO Box 1379
Townsville Qld 4810

University of the South Pacific
Box 1168
Suva, Fiji

PROJECT LEADERS:

Dr L. Zann (077) 818811
Ms G. Brodie

CONTACT OFFICER:

Dr L. Zann

EXPENDITURE:

$4,000 (this year), $23,750 (all years)

OBJECTIVES

To identify commonalities among widely separated geographic areas which have experienced crown of thorns starfish outbreaks.
To test the predator removal hypothesis.

METHODOLOGY

A database of Pacific infestations is to be set up from reports of previous infestations and information obtained from surveys and questionnaires.

STATUS

Literature review completed. Surveys and questionnaires completed in Fiji and Cook Islands and reports received. Starfish records for Torres Strait, Western Australia, Papua New Guinea, Vanuatu are established. Analyses and correlations to be undertaken in 1988/89. Details available from project leader.

GEOGRAPHIC REGIONS: R,P

MAJOR DESCRIPTORS: Distribution patterns/Man-induced effects/Coral reefs/Infestations/Crown of thorns starfish/

TAXONOMIC TERMS: Acanthaster planci

[GBRMPA123]

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239 **Relationships between crown of thorns starfish *Acanthaster planci* outbreaks and water mass characteristics in the Great Barrier Reef region.**

February 1986 -

ORGANIZATION:

Great Barrier Reef Marine Park Authority
PO Box 1379
Townsville Qld 4810

PROJECT LEADER:

Dr L. Zann (077) 818811

EXPENDITURE:

$4,200 (this year), $55,000 (all years)

OBJECTIVES

To determine broad scale patterns of productivity and of terrestrial water discharge using coastal zone colour scanning and other remotely sensed imagery.
To relate these patterns to *Acanthaster planci* distributions.

METHODOLOGY

Analysis of coastal zone colour scan images to delineate areas showing chlorophyll a and water colour distribution over the region.

STATUS

Process specifications have been refined and qualitative variation in chlorophyll concentration may be clearly displayed in treated images. Six treated images have so far been completed and another five are to be processed before conclusion of the project, covering most sites on the Reef at least three times. Comparison with historical ground truth data may allow a quantitative scale of chlorophyll concentration to be applied to images.

CO-ORDINATION WITH OTHER PROJECTS

Coordination with AIMS and COTSAC studies.

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Crown of thorns starfish/Distribution patterns/Outflow waters/Coastal oceanography/Remote sensing/

TAXONOMIC TERMS: Acanthaster planci

[GBRMPA124]

240 Survey of distribution and abundance of crown-of-thorns starfish (*Acanthaster planci*) on reefs of the Whitsunday region.

December 1988 - February 1989

ORGANIZATIONS:

Great Barrier Reef Marine Park Authority
PO Box 1379
Townsville, Qld 4810

James Cook University
Post Office
James Cook University, Qld 4810

Australian Institute of Marine Science
PMB No. 3
Townsville MC, Qld 4810

PROJECT LEADERS:

Dr L. Zann (077) 818811
Mr A. van Woesik (077) 814111
Mr A. Steven
Mr L. DeVantier (077) 789211

CONTACT OFFICER:

Dr L. Zann

EXPENDITURE:

$8,986 (this year)

METHODOLOGY

1. To survey reef for crown-of-thorns starfish using manta tow surveys where visibility allows, and replicate SCUBA dives in turbid waters.
2. Where crown-of-thorns starfish in low numbers are encountered during spot diving surveys, they are to be injected. Where densities are such that injection would jeopardize the completion of this survey in the agreed time, sites are to be buoyed for later control programs. Such buoys should be identified "Marine Parks Research - Please Do Not Remove". Records of starfish injected to be kept, together with locations.

STATUS

Surveys were conducted and then controls initiated using volunteer boat operators and divers.

Completed Project - This project will remain in the computerized Register for another 5 years but will not be included in future issues of the Compendium.

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Crown of thorns starfish/Coral reefs/Predator control/Quantitative distribution/

TAXONOMIC TERMS: Acanthaster planci

[GBRMPA188]

241 Trial control of crown of thorns starfish on the Great Barrier Reef.

May 1986 -

ORGANIZATIONS:

Great Barrier Reef Marine Park Authority
PO Box 1379
Townsville Qld 4810

Australian Institute of Marine Science
PMB 3 MSO
Townsville, Qld 4810

Royal Australian Navy

PROJECT LEADERS:

Dr L. Zann (077) 818811
Dr P. Moran (077) 789211

CONTACT OFFICER:

Dr L. Zann

EXPENDITURE:

$10,000 (this year), $57,000 (all years)

OBJECTIVES

To test feasibility of crown of thorns starfish control by hand.
To assess cost/benefits.
To establish contingency plans for infestations and conduct a variety of related experiments.

METHODOLOGY

Site of trial control determined in conjunction with AIMS survey results. Volunteer divers (RAN) will then be used to destroy the starfish to evaluate the efficiency of control methods. Several methods of killing to be examined.

STATUS

Trial control using RAN volunteers held on Grub Reef in July 1986 with post control checks made during surveys by AIMS. Limited eradication undertaken on John Brewer Reef in January 1987; Whole reef control attempted on Holborne Island Reef in April and June 1987. A review of control programs in press.

LOCALITIES: Grub Reef; John Brewer Reef; Holborne Island
GEOGRAPHIC REGION: R
MAJOR DESCRIPTORS: Feasibility studies/Coral reefs/Predator control/Crown of thorns starfish/
TAXONOMIC TERMS: Acanthaster planci

[GBRMPA117]

242 An empirical test of the recruitment-limitation hypothesis.

January 1989 - December 1991

ORGANIZATION:
Griffith University, Division of Australian Environmental Studies
Kessels Road
Nathan, Qld 4111

PROJECT LEADER:
Dr P. Doherty (07) 2757408

EXPENDITURE:
$22,000 (this year), $120,000 (all years)

MANPOWER:
1.00 (this year), 5.00 (all years)

EXTERNAL SUPPORT:
ARC - $44,000

OBJECTIVES

1. To measure cohort strength of 0+ fishes in seven coral reef lagoons over nine consecutive years.
2. To collect samples from these populations in order to determine their densities and age structures.
3. To examine the demographic histories of each population for differences in survivorship and evidence of compensatory mortality.
4. To monitor recovery of the depopulated reefs.

METHODOLOGY

Annual censuses of 10 large patch reefs have been carried out at the same time of year in seven coral reef lagoons (Wistari, Heron, One Tree, Fitzroy, Llewellyn, Fairfax, Lady Musgrave) since April 1981. These surveys indicate the relative replenishment of the reef by larval fishes. In 1989, these populations will be censused for the final time in April and collected in October. Their age structures will be determined by otolith analysis. The spatio- temporal record of recruitment will be compared with the resultant population structures to determine whether reef fish assemblages are equilibrial, responding to resource availability, or whether they are non-equilibrial, being driven by fluctuating recruitment.

STATUS

The recruitment data for eight year-classes on 70 patch reefs has been collected and analysed. The ninth and final census will be done in April: the populations will be collected in October. Essential validation of the ageing techniques was started in 1988.

CO-ORDINATION WITH OTHER PROJECTS

Validation of the ageing techniques was started in 1988 by Dr A. Fowler, Australian Institute of Marine Science.

LOCALITY: Bunker-Capricorn Group
GEOGRAPHIC REGION: R
SHIP TIME REQUIREMENTS: 40 days
MAJOR DESCRIPTORS: Coral reefs/Lagoons/Reef fish/Population density/Age composition/

[GRIFFI015]

243 Plankton sampling with light-traps.

January 1986 - December 1989

ORGANIZATION:
Griffith University, Division of Australian Environmental Studies
Kessels Road
Nathan, Qld 4111

PROJECT LEADER:
Dr P. Doherty (07) 2757408

EXPENDITURE:
$55,000 (this year), $150,000 (all years)

MANPOWER:
2.50 (this year), 8.00 (all years)

EXTERNAL SUPPORT:
MSTGS - $84,000
ARC - $58,000

OBJECTIVES

1. To quantify the selectivity of plankton catches from light-traps.
2. To sample photo-positive nocturnal zooplankton and larval fishes over extended periods to reveal temporal variations including interannual ones.
3. To sample nearshore waters on two sides (upstream/downstream) of a high continental island to investigate "island mass" effects on plankton abundance.
4. To compare the abundance of pelagic pre-settlement reef fish with rates of recruitment monitored in adjacent benthic habitats.

METHODOLOGY

Submersible, automated light-traps (AMRIP GRIFFI013) allow extended synoptic sampling of the relative abundance of nocturnal photo-positive plankton including many species of larval fish. Much of this material is relatively large and being in live condition, it can be identified to species level. Traps will be deployed in different spatial configurations around Lizard Island and monitored for at least 100 consecutive nights in three consecutive summer breeding seasons. Catches of fish and invertebrates will be examined for lunar synchrony, interannual variability and consistent spatial patterns. Simultaneous clearance of newly-settled fishes from artificial patch reefs will examine directly the connection between pelagic and benthic environments.

STATUS

Essential validation comparing catches from various plankton nets, light-traps and larval purse seines around submerged lights was done in December 1986. Catch data are available from three traps on the windward side in 1986/ 1987 and three traps on both sides of the island in 1987/88. The present programme of field sampling will finish in February 1989 and all catches will be analysed by December.

CO-ORDINATION WITH OTHER PROJECTS

The validation exercise involved principals from Griffith University, James Cook University and the Australian Museum. Material has been curated by scientists at the Australian Museum, National Museum and Queensland Museum. Persons interested in particular taxa are urged to contact the project leader for access to the samples.

LOCALITY: Lizard Island

GEOGRAPHIC REGION: R

SHIP TIME REQUIREMENTS: 120 days of 6m vessel from Lizard Island Research Station.

MAJOR DESCRIPTORS: Plankton surveys/Plankton collecting devices/Reef fish/Temporal variations/

[GRIFFI014]

244 Population biology of the tropical gastropod *Strombus luhuanus*, and resilience of molluscs to human exploitation.

September 1980 - December 1991

ORGANIZATIONS:
Griffith University, School of Australian Environmental Studies
Nathan, Qld 4111

CSIRO, Division of Fisheries
Cleveland Marine Laboratories
PO Box 120
Cleveland, Qld 4163

PROJECT LEADERS:
Dr C.P. Catterall (07) 2757111
Dr I.R. Poiner (07) 2862022

CONTACT OFFICER:
Dr C.P. Catterall

EXPENDITURE:
$3,000 (this year), $121,000 (all years)

MANPOWER:
0.50 (this year), 5.50 (all years)

EXTERNAL SUPPORT:
MSTGS - $80,281 (1984, 1985, 1986)

OBJECTIVE

To use *Strombus luhuanus* as a 'model' tropical coral-reef gastropod, for a population-level investigation into a variety of ecological questions concerning resource limitation, strategies of spatial dispersion and effects of human exploitation.

METHODOLOGY

1. Descriptive monitoring by means of transect sampling (density, age-structure, recruitment rates, temporal variations, habitat parameters.
2. Mark-recapture techniques (growth rates, movements).
3. Behavioural observations (food, feeding, short-term movements).
4. Experimental manipulations (density effects, predation rates, effects of human exploitation).
5. Shell midden analysis.

STATUS

Documentation of basic biology of *Strombus luhuanus* (growth-curve, feeding, reproduction, predators, longevity, seasonality), is nearing completion. Individuals are characteristically clumped. There is significant variation in the mean sizes of individuals among local populations; this variation is correlated with population density; field experiments suggest a causal relationship. We predict that populations should be resilient to collection of a large proportion of adults, but not pre-adult stages. Rapid recolonisation of experimentally cleared areas occurred due to both movement of benthic adults and recruitment of settling juveniles. Burying gives partial protection from human predation. Shell midden data are currently being used to compare exploitation effects on molluscs with different history patterns. This information is summarised in publications, and is also held on computer database.

GEOGRAPHIC REGIONS: R,O

MAJOR DESCRIPTORS: Population dynamics/Exploitation/Resource depletion/Gastropods/

TAXONOMIC TERMS: Strombus luhuanus; Mollusca

[GRIFFI010]

245* Nutrient metabolism in corals and the interaction between host and symbiont.

January 1985 - December 1988

ORGANIZATION:

James Cook University of North Queensland
PO James Cook University, Qld 4811

PROJECT LEADERS:

Dr D. Yellowlees (077) 814463
Dr D. Miller (077) 814463

CONTACT OFFICER:

Dr D. Yellowlees

MANPOWER:

2.00 (this year), 6.00 (all years)

EXTERNAL SUPPORT:

MSTGS - $95,204 (1985/1988)

OBJECTIVE

To study the interaction of coral polyp cells and symbiont algae with respect to carbon, nitrogen and phosphorus metabolism: and to investigate the effect variations in environmental conditions have on their metabolism.

METHODOLOGY

Use of radioactive substrates to follow metabolism and transport. Characterisation and kinetics of key enzymes. Variation of environmental conditions in laboratory to study changes in metabolism.

STATUS

The study of nitrogen metabolism is fairly well advanced with respect to both host and symbiont. Glutamate dehydrogenase has been well characterised in both organisms. The phosphate transport system in zooxanthellae and two phosphateses have also been characterised. The assessment of changes in environmental conditions is in progress.

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Coral/Algae/Symbiosis/Environmental factors/Nutrient cycles/

[JAMESC112]

246* An assessment of the Acanthaster phenomenon through a consideration of the life history strategy of *A. planci*.

March 1988 -

ORGANIZATION:
James Cook University of North Queensland,
Department of Civil and Systems Engineering
Townsville, Qld 4811

PROJECT LEADERS:
Dr M.K. James (077) 814224
Prof R. Jones (077) 814530
Mr I.J. Dight (077) 814810

CONTACT OFFICER:
Mr I.J. Dight

EXTERNAL SUPPORT:
COTSAC - $15,000

OBJECTIVE
To further develop an existing hydrodynamic/dispersal model of reef connectivity into an appropriate and flexible population model for examining the life-history strategy of *Acanthaster planci*.

METHODOLOGY
This proposal aims to assess the Acanthaster phenomenon in light of model results and life-history theory. The goal is to identify what patterns of survivorship and abundance *A. planci* appears best adapted to. The critical question for *A. planci* is whether it possesses attributes which are adaptations to high variability in its own population density. This will be achieved through testing alternative hypotheses by maintaining the life- history characteristics of *A. planci* constant while varying the context within which they operate.

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Crown of thorns starfish/Life history/Population density/

TAXONOMIC TERMS: Acanthaster planci

[JAMESC116]

247* **Role of crown of thorns starfish *Acanthaster planci* in reef degradational processes: historical perspective and current influence.**

September 1985 - December 1988

ORGANIZATIONS:
James Cook University of North Queensland,
Department of Geology
Townsville, Qld 4811

Great Barrier Reef Marine Park Authority
PO Box 1379
Townsville, Qld 4810

PROJECT LEADERS:
Dr R.A. Henderson (077) 814536
Dr L. Zann (07) 818811

CONTACT OFFICER:
Dr R.A. Henderson

EXPENDITURE:
$0 (this year), $84,540 (all years)

MANPOWER:
2.00 (this year), 8.00 (all years)

OBJECTIVES
1. To assess the Holocene record of *Acanthaster planci* in the Great Barrier Reef province from fossil remains incorporated in sediment.
2. To consider the role of *A. planci* in reef degradational processes.

METHODOLOGY
1. Collection of reefal sediment by grab sampling and vibrocoring.
2. Study of three dimensional reef and sediment body geometry by seismic (3.5 KHz PDR and uniboom) and sonar means.
3. Categorization of sediment in terms of texture and provenance. C^{14} dating to give a time framework for cores.
4. Investigation of carbonate degradational processes.

STATUS
Atlas of elements published (refer GBRMPA096). Sampling of surface sediments from Green Island, John Brewer Reef and Heron Island and coring of Green Island and John Brewer Reef completed. Preliminary dating completed. Individual AMS dating underway in USA.

CO-ORDINATION WITH OTHER PROJECTS
Collaboration with the Radiocarbon Laboratory, Australian National University, the Institute of Nuclear Sciences, Wellington, NZ and with the Petroleum and Marine Division of the Bureau of Mineral Resources.

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Holocene/Fossils/Coral reefs/Degradation/Crown of thorns starfish/
TAXONOMIC TERMS: Acanthaster planci

[JAMESC092]

248* The relations between ecological variability and statistical inference in the description and monitoring of ecological systems.

May 1988 - May 1991

ORGANIZATION:
James Cook University of North Queensland,
Department of Marine Biology
Townsville, Qld 4811

PROJECT LEADERS:
Dr B.D. Mapstone (02) 6923600 or (077) 814345
Prof J.H. Choat (077) 814345

CONTACT OFFICER:
Dr B.D. Mapstone

OBJECTIVES

To examine and characterise variability in complex systems at several spatial and temporal scales. Subsequently to use models to estimate resolution with which patterns and processes might be detected and relate these results to the nature of inferences usually drawn from statistical analyses.
To recommend optimal approaches to description and monitoring studies and suggest limitations for hypotheses to be tested and of existing statistical procedures.

METHODOLOGY

A range of field methods for estimating abundances. Computer simulations and modelling.

STATUS

Baseline searches of literature only.

GEOGRAPHIC REGION: R
MAJOR DESCRIPTORS: Ecosystems/Statistical analysis/Monitoring/Mathematical models/

[JAMESC107]

249* Studies on toxic dinoflagellates responsible for formation of ciguatoxin.

ORGANIZATION:
Queensland Department of Primary
Industries, Southern Fisheries Research Centre
PO Box 76
Deception Bay, Qld 4508

PROJECT LEADER:
Dr N.C. Gillespie (07) 2031444

EXPENDITURE:
$39,000 (this year), $93,000 (all years)

MANPOWER:
3.00 (this year), 12.00 (all years)

EXTERNAL SUPPORT:
FIRTA - $9,700

OBJECTIVES

1. Determine the distribution of the known elaborator of ciguatoxin, the dinoflagellate *Gambierdiscus toxicus* in ciguateric areas on the Queensland coast.
2. Investigate factors influencing the distribution of the organism.
3. Isolate and culture the organisms with a view to producing ciguatoxin.

METHODOLOGY

1. Collection of macroalgal specimens in coral reef locations along Queensland coast, processing and sieving to obtain fraction containing *G. toxicus* .
2. Counting of *G. toxicus* and other benthic dinoflagellates by microscopic methods.
3. Identification of algae from which *G. toxicus* is isolated.
4. Toxin assay of wild and cultured cells by solvent extraction and animal bioassay using mice.
5. Culture of isolated strains under varying conditions of temperature and substrate.

STATUS

The distribution of benthic dinoflagellates along the Queensland coast is now well understood. The toxicity of a wild population of *G. toxicus* from Flinders Reef in southern Queensland was assayed and while maitotoxin was present, no ciguatoxin was found. Subsequently a number of experiments linking reef disturbance with ciguatera outbreaks has resulted in the detection of a toxic fraction in laboratory culture of *G. toxicus* that would appear chemically similar to ciguatoxin.

GEOGRAPHIC REGIONS: R,Q
SHIP TIME REQUIREMENTS: 20 days

MAJOR DESCRIPTORS: Ciguatoxin/Poisonous organisms/Ecological distribution/Laboratory culture/
TAXONOMIC TERMS: Gambierdiscus toxicus

[QDPI—016]

250 Chemical approaches to food chain studies.

January 1982 - December 1988

ORGANIZATION:
University of Melbourne, School of Chemistry
Parkville, Vic 3052

PROJECT LEADER:
Dr R.B. Johns (03) 3446490

EXPENDITURE:
$17,903 (this year), $34,963 (all years)

MANPOWER:
3.00 (this year), 5.00 (all years)

EXTERNAL SUPPORT:
MSTGS - $8,777
GBRMPA - $1,000 (Supplementation for 1986 for Barrier Reef work.)

OBJECTIVE
To determine, by the use of chemical biological markers, (i) the likely food sources of the zooplankton and immature vertebrates studied; (ii) the likely microbial contributions to contemporary sediments and particulates.

METHODOLOGY
Centres primarily on the isolation and purification of geo- and bio-lipids, which is achieved by the adaptation of conventional techniques of lipid chemistry. Structural determinations are carried out. Non-contaminatory methods of handling materials are necessary.

STATUS
A study of zooplankton, especially *Acartia* species, is continuing. This has placed emphasis on an understanding of inputs to the particulate matter fraction which is likely to be consumed by the zooplankton. The study has been over seagrass beds in Victoria and also from the Lizard Island lagoon. Some conclusions as to inputs are proving to be quite firm. Some Bass Strait juvenile fish are being studied for their composition in terms of fatty acids which are likely to be food chain in origin.

Completed Project - This project will remain in the computerized Register for another 5 years but will not be included in future issues of the Compendium.

LOCALITIES: Corner Inlet; Lizard Island; Gippsland Lakes; Westernport Bay; Bass Strait
GEOGRAPHIC REGIONS: B,R
MAJOR DESCRIPTORS: Biochemistry/Food chains/Zooplankton/Fish/Sedimentation/
TAXONOMIC TERMS: Acartia

[UNIMEL068]

251* Ecology of marine parasites.

January 1976 - December 1989

ORGANIZATION:
University of New England, Department of Zoology
Armidale, NSW 2351

PROJECT LEADER:
A/Prof K. Rohde (067) 732888

EXPENDITURE:
$26,302 (this year), $140,000 (all years)

MANPOWER:
2.50 (this year), 25.00 (all years)

EXTERNAL SUPPORT:
ARC - $26,302

OBJECTIVE
To study the ecology, evolution, zoogeography and taxonomy of marine parasites.

METHODOLOGY
Light microscopy, electron microscopy, histology.

STATUS

Taxonomy, geographical distribution and ecology of marine parasites, particularly ectoparasites, is being studied.
150 species of Monogenea, Copepoda and endoparasites described (including those by postgraduate students).

CO-ORDINATION WITH OTHER PROJECTS

Collaboration with CSIRO Cronulla, various state fisheries departments, Antarctic Division

GEOGRAPHIC REGIONS: B,G,R,Q,N
MAJOR DESCRIPTORS: Parasites/Biogeography/Ecology/Taxonomy/
TAXONOMIC TERMS: Monogenea; Copepoda

[UNIARM002]

252 Ecology of the Swain Reefs.

ORGANIZATION:
University of New England, Department of Zoology
Armidale, NSW 2351

PROJECT LEADER:
Assoc Prof H. Heatwole (067) 733333

EXPENDITURE:
$25,000 (this year), $45,000 (all years)

EXTERNAL SUPPORT:
NSF (USA) - $19,500
Meyers Foundation - $3,700
MSTGS - $72,460

OBJECTIVES

1. To study the community ecology of coral cays, especially the influence upon the vegetation by sea birds, turtles, substrate instability and salt.
2. To study factors affecting the local distribution of marine organisms on the reef.

METHODOLOGY

Quantitative sampling along transects on the islands and underwater.

STATUS

191 scientific publications including 6 books.

LOCALITY: Swain Reefs
GEOGRAPHIC REGION: R
MAJOR DESCRIPTORS: Ecology/Cays/Coral reefs/Community composition/Marine organisms/

[UNIARM005]

253 Algal succession at Heron Island.

January 1986 - June 1989

ORGANIZATION:
University of Queensland, Department of Botany
St. Lucia, Qld 4067

PROJECT LEADERS:
Ms C. Catterall (07) 3772731
Dr R.W. Rogers
Dr A.B. Cribb

CONTACT OFFICER:
Ms C. Catterall

EXPENDITURE:
$2,000 (this year), $10,000 (all years)

MANPOWER:
1.10 (this year), 4.00 (all years)

OBJECTIVE

To determine the succession of algae on bare surfaces in contrasting environments of a reef flat, and the impact of season of exposure on this succession. Impact of large herbivores is also observed.

METHODOLOGY

Concrete plates have been exposed on the inner and outer reef flat area of Heron Island. These are observed at intervals from ten days to two years after exposure. Plates have exposed at four times in the year, and some have been been protected from large grazers.

STATUS

Collection of field data is almost complete, and data is being processed onto diskettes.

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Algae/Autecology/Algology/Temporal variations/Reefs/

[UNIQLD102]

254 Distribution of algae at Heron Island.

ORGANIZATION:

University of Queensland, Department of Botany
St. Lucia, Qld 4067

PROJECT LEADER:

Dr R.W. Rogers (07) 3772790

EXPENDITURE:

$1,500 (this year), $20,000 (all years)

OBJECTIVE

To determine and explain the patterns of algal distribution on the reef flat at Heron Island.

METHODOLOGY

Field surveys of density of selected algae on the reef flat will be undertaken. Biomass allocations will be determined, and apparent strategies and factors controlling distributions examined.

STATUS

Analyses of dry matter distribution to photosynthetic and rhizoidal attachment systems of *Caulerpa* and *Halimeda* species colonising sandy areas has been undertaken. Distribution of *Caulerpa cupressoides* on portion of the flat has been mapped in terms of metres of algal rhizome per square metre of area.

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Algae/Ecological distribution/Reefs/Algology/Biomass/

TAXONOMIC TERMS: Caulerpa; Halimeda; Caulerpa cupressoides

[UNIQLD103]

255 Diseases of cultured penaeid prawns.

February 1986 - December 1989

ORGANIZATIONS:

University of Queensland, Department of Parasitology
St Lucia, Qld 4067

University of Queensland, Department of Microbiology

Queensland Department of Primary Industries, Fisheries Management Branch

Queensland Department of Primary Industries, Animal Research Institute

PROJECT LEADERS:

Professor C. Dobson (07) 3772572
Mr G. McCormack (07) 2775139
Dr J.G. Atherton (07) 3773639

CONTACT OFFICER:

Dr R.J.G. Lester (07) 3773305

EXPENDITURE:

$60,000 (this year)

MANPOWER:

4.00 (this year)

EXTERNAL SUPPORT:

FIRTA - $92,834 (1986 to 1989)
RCDF - $60,000 (1987 and 1989)

OBJECTIVES

1. To determine what diseases are present in Australian cultured penaeids.
2. To develop an effective disease screening procedure for live prawns moved interstate.

METHODOLOGY

Fresh examination and subsequent histopathology of prawns before and after they have been kept under viral enhancement conditions. Confirmation of virus by electron microscopy. Development of serological diagnostic techniques.

GEOGRAPHIC REGIONS: Y,R,Q,N

MAJOR DESCRIPTORS: Prawn culture/Diseases/Disease detection/

TAXONOMIC TERMS: Penaeus esculentus; Penaeidae

[UNIQLD096]

256 Effects of parasite infection on the population dynamics of a pomacentrid fish at Heron Island.

December 1984 - February 1989

ORGANIZATION:
University of Queensland, Department of Parasitology
St Lucia, Qld 4067

PROJECT LEADERS:
Dr R.J.G. Lester (07) 3773305
Prof C. Dobson (07) 3772572

CONTACT OFFICER:
Dr R.J.G. Lester

EXTERNAL SUPPORT:
MSTGS - $33,427 (1987)

OBJECTIVE
To analyse the effects of parasite infection on the population dynamics of a pomacentrid at Heron Island, and to test the effectiveness of the analysis by reference to a second site with a different parasite load.

STATUS
Full results in doctoral thesis of R.D. Adland, University of Queensland; expected date for submission February 1989.

LOCALITY: Heron Island
GEOGRAPHIC REGION: R
MAJOR DESCRIPTORS: Parasites/Population dynamics/Parasitic diseases/Reef fish/
TAXONOMIC TERMS: Pomacentridae

[UNIQLD068]

257 Parasitic diseases of reef bivalves with particular reference to *Perkinsus* sp. in giant clams.

February 1986 - December 1989

ORGANIZATIONS:
University of Queensland, Department of Parasitology
St Lucia, Qld 4067
Queensland National Parks and Wildlife Service
Maritime Estates
Cairns, Qld 4870

PROJECT LEADERS:
Dr R.J.G. Lester (07) 3773305
Mr P. Hunnam (070) 519811

CONTACT OFFICER:
Dr R.J.G. Lester

EXPENDITURE:
$30,000 (this year)

MANPOWER:
1.00 (this year)

EXTERNAL SUPPORT:
MSTGS - $58,243 (1987, 1988 and 1989)
Commonwealth Graduate Student Award - $24,000

OBJECTIVE
To identify diseases in reef bivalves, particularly those that may be causing mortality in giant clams.

METHODOLOGY
Initial histopathology and *in vitro* culture followed by electron microscopy and experimental infections.

STATUS
Two possible pathogens have been found in dying *Tridacna gigas*. A survey for *Perkinsus* species has been conducted in molluscs at Lizard, Orpheus and Heron Reefs. Cross-infection experiments are in progress.

CO-ORDINATION WITH OTHER PROJECTS
The project is linked to 'Clam Watch' a reporting system for dying and dead clams organised by the Queensland National Parks and Wildlife Service.

GEOGRAPHIC REGION: R
MAJOR DESCRIPTORS: Molluscs/Parasitic diseases/Mortality causes/Coral reefs/
TAXONOMIC TERMS: Perkinsus; Tridacna

[UNIQLD095]

258 **Abundance, schooling behaviour and population composition of sprats *Clupeidae* and silversides *Atherinidae* .**

November 1982 - November 1988

ORGANIZATION:
University of Queensland, Department of Zoology
St Lucia, Qld 4067

PROJECT LEADER:
Dr K. Warburton (07) 3772979

EXPENDITURE:
$1,550 (this year), $3,500 (all years)

MANPOWER:
1.00 (this year), 1.50 (all years)

EXTERNAL SUPPORT:
Australian-American Educational Foundation (Fullbright Exchange Program) - $750 (Provides monthly stipend, and home host courtesy, transpo. Supplement allowance of $750 is provided for research needs.)
GBRMPA - $1,660 (Provides for bench fees and return transport to One Tree Island, GBR.)

OBJECTIVES
1. Quantifications of temporal and spatial variation in abundance and biomass of atherinids and clupeoids.
2. Interspecific comparison of variaton in schooling behavior, school density, and school structure between atherinids and clupeoids.
3. Assessment of the population composition and predation mortality of atherinids and clupeoids.

METHODOLOGY
1. Assessed by way of transect censusing (visual observation) and sampling of study species.
2. Assessed by way of visual observation and photography of fish schools.
3. Assessed by length and weight frequency analysis relative age, and sex identification.

STATUS
Project completed and written up for MSc (now awarded). Data as hard copy available through project leader.

Completed Project - This project will remain in the computerized Register for another 5 years but will not be included in future issues of the Compendium.

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Fish/Population dynamics/Schooling behaviour/Temporal variations/Spatial variations/

TAXONOMIC TERMS: Clupeidae; Atherinidae

[UNIQLD036]

259* **Benthic community structure and organization in Heron Island Lagoon soft sediments.**

July 1983 -

ORGANIZATION:
University of Queensland, Department of Zoology
St Lucia, Qld 4067

PROJECT LEADER:
Mr B.G. Long

CONTACT OFFICER:
Dr T.S. Hailstone (07) 3772508 (Supervisor)

EXPENDITURE:
$750 (this year), $1,650 (all years)

MANPOWER:
0.90 (this year), 1.90 (all years)

EXTERNAL SUPPORT:
GBRMPA - $1,800

OBJECTIVES
To investigate biological characteristics of the communities of benthic macrofauna associated with Heron Island lagoon sediments.
To study in detail the spatial and temporal variability of these communities and their more common

species.
To investigate factors which are postulated to have major influences on community organization.
Comparison with similar communities associated with One Tree Island lagoon sediments is also being attempted.

METHODOLOGY

Grid-marked study areas are sampled repeatedly with replicate grab-sampling techniques. Species abundance data are accumulated from these samplings and are subjected to computerized analyses which reveal community groupings and various salient aspects of community structure. Monitoring of abiotic variables that are suspected of influencing community structure and distribution is also being undertaken. Biological determinants of community organization are being investigated with a series of specially designed field cage-experiments.

STATUS

Field studies for this project have been completed, results are being analysed, and they should be submitted as a PhD. thesis later in 1988.

LOCALITIES: Heron Island; One Tree Island

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Community composition/Benthos/Sediments/Abiotic factors/Lagoons/

[UNIQLD078]

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260 **Ecological importance of patterning in the emergence of demersal zooplankton.**

February 1984 - December 1989

ORGANIZATION:
University of Queensland, Department of Zoology
St Lucia, Qld 4067

PROJECT LEADERS:
Dr J.G. Greenwood (07) 3772054
Dr C.A. Jacoby (07) 3772491

CONTACT OFFICER:
Dr C.A. Jacoby

EXPENDITURE:
$12,000 (this year), $26,700 (all years)

MANPOWER:
1.00 (this year), 3.20 (all years)

EXTERNAL SUPPORT:
ARGS - $10,000
Harbour Branch Foundation, Florida, USA (Loan of rotary emergence traps.)
ARGS, Queens Fellowship

OBJECTIVE

To examine temporal patterns in the emergence and imergence of demersal animals relevant to sand, coral and sea- grass habitats in waters of the southern Great Barrier Reef (Heron Island) and central eastern Australia (Moreton Bay).

METHODOLOGY

Samples taken with rotary emergence traps (allowing sequential diel sampling at selected time intervals), simple emergence traps and re-entry traps containing differing sediment types/fractions.

STATUS

Two ecological papers published on data from Heron Island and Moreton Bay; and other data in preparation.

CO-ORDINATION WITH OTHER PROJECTS

Queen's Fellowship research project on demersal zooplankton as submitted by Dr C.A. Jacoby.

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Zooplankton/Ecological distribution/Emergence/Benthic environment/Temporal variations/

[UNIQLD052]

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261 **Population dynamics of parasites on reef fish.**

December 1985 - March 1989

ORGANIZATION:
University of Queensland, Department of Zoology
St Lucia, Qld. 4067

PROJECT LEADERS:
Dr H.I. McCallum (07) 3772450
Dr R.J.G. Lester (07) 3773305

CONTACT OFFICER:
Dr H.I. McCallum

EXPENDITURE:
$8,000 (this year), $13,000 (all years)

MANPOWER:
0.25 (this year), 0.50 (all years)

OBJECTIVE
To investigate the effects of habitat heterogeneity on the interaction between the pomacentrid *Chromis nitida* and its copepod parasite *Pseudacanthocanthopis rohdei*.

METHODOLOGY
(i) Fish will be collected using quinaldine, and parasite burdens compared between age classes, sampling sites and sampling times.
(ii) Mathematical models will be developed to investigate the effects of spatial patchiness on host-parasite interactions.
(iii) Arrays of artificial coral bommies will be constructed at several different spacings and the parasite burdens of fish recruiting onto them will be determined. These results will be compared with the model predictions.

STATUS
Sections (i) and (ii) of the above methodology have been completed. Section (iii) will be completed in January 1989.

GEOGRAPHIC REGION: R
MAJOR DESCRIPTORS: Reef fisheries/Parasites/Population dynamics/Habitat/
TAXONOMIC TERMS: Pseudacanthocanthopis rohdei; Chromis nitida

[UNIQLD075]

262* **Study of crown-of-thorns starfish predators on or in the vicinity of reefs of the Great Barrier Reef.**

June 1986 -

ORGANIZATION:
University of Queensland, Department of Zoology
St Lucia, Qld 4067

PROJECT LEADERS:
Assoc Prof R. Endean (07) 3772482
Dr A.M. Cameron (07) 3772506
Dr H.I. McCallum (07) 3772450

CONTACT OFFICER:
Assoc Prof R. Endean

EXPENDITURE:
$49,950 (all years)

MANPOWER:
4.00 (all years)

EXTERNAL SUPPORT:
COTSAC (GBRMPA) ($49,950)

OBJECTIVES
1. To determine as many as possible of the specialist and/or generalist predators of *Acanthaster planci* found on reefs of the Great Barrier Reef.
2. To determine the population density of each of these predators on selected reefs, some of which are carrying *A. planci* outbreaks others of which have not carried such outbreaks during the last 25 years.
3. To test the hypothesis that removal of predators by humans has initiated *A. planci* population explosions.

METHODOLOGY
Areas of reef which carry *A. planci* aggregations will be searched systematically for instances of predation on the starfish. Potential predators will be placed in enclosures with *A. planci* adults and juveniles covering an appropriate range of sizes. Suitable censusing techniques will be used to determine

population densities of predators found on reefs infested with *A. planci* and found on reefs that have not carried infestations during the last 25 years. The results obtained will be related to known human activities (shell collecting, collecting of fishes) on particular reefs.

STATUS

Some data on known and new predators of *A. planci* have been obtained access via GBRMPA.

CO-ORDINATION WITH OTHER PROJECTS

This project is part of a program coordinated by the Crown of Thorns Starfish Advisory Committee (COTSAC).

GEOGRAPHIC REGION: R

SHIP TIME REQUIREMENTS: 20 days

MAJOR DESCRIPTORS: Crown of thorns starfish/Predators/Man-induced effects/Population number/

TAXONOMIC TERMS: Acanthaster planci

[UNIQLD118]

263 Primary production and carbon flow through detritus pathways on a coral reef

January 1987 -

ORGANIZATION:

University of Sydney, School of Biological Sciences
A12, NSW 2006

PROJECT LEADERS:

Assoc Prof A.W.D. Larkum (02) 6922069
Dr J. Hansen (02) 6924241

CONTACT OFFICER:

Ms E. O'Brien (02) 6924241

EXPENDITURE:

$79,000 (this year), $79,000 (all years)

MANPOWER:

2.50 (this year), 2.50 (all years)

EXTERNAL SUPPORT:

MSTGS - $79,000

OBJECTIVE

To correlate primary production and detritus production on the reef flat and lagoon of a coral reef. The limits on production will be assessed and the feedback processes working between production, detritus formation and mineralization assessed. Secondary production and its dependence on detritus formation will be investigated.

METHODOLOGY

Primary production is investigated using oxygen electrode chambers. The effect of nutrients (N and P) is followed using enrichment procedures in the same chambers. Flow of C and N species across the waters of the reef are followed by sea water chemical analyses. Detritus is measured by standard techniques. Bacterial numbers and production are followed by acridine orange and tritiated thymidine assays.

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Coral reefs/Primary production/Secondary production/Nutrients (mineral)/Detritus/

[UNISYD170]

264 Role of detritus in the nitrogen budget of Coral Reef Lagoon.

January 1984 - December 1991

ORGANIZATION:

University of Sydney, School of Biological Sciences
Building A12
Sydney, NSW 2006

PROJECT LEADER:

Assoc Prof A.W.D. Larkum (02) 6922069

EXPENDITURE:

$0 (this year), $154,750 (all years)

MANPOWER:

2.50 (this year), 8.50 (all years)

OBJECTIVES

Investigation of the pathways and role of bacteria in the transfer of material, particularly nitrogen, from the products of primary production back into the water column of a coral reef. In particular the

following processes have been studied.
1. Concentrations of particulate material in reef waters.
2. Settlement of particulate material onto the lagoon floor.
3. Decomposition of organic material in the water column, on the lagoon floor and in the lagoon sediments.
4. Processes of mineralisation.
5. Fluxes of material into and out of the water column.

METHODOLOGY

Particulate matter is collected in litter traps and analysed for C/N content. Sediments are analysed *in situ* for C/N content, bacterial type and numbers, oxygen, pH and eH to a depth of 25cm. Fluxes of nutrients are measured using domes placed over the lagoon floor.

STATUS

A number of papers have been published or are in press.

CO-ORDINATION WITH OTHER PROJECTS

This project is co-ordinated with the project "Fluxes of inorganic nitrogen through benthic sediments on a coral reef". (R.W. Johnstone)

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Nitrogen fixation/Bacteria/Coral reefs/Abiotic factors/

[UNISYD046]

265 The role of sponges in the ecology of coral reefs.

January 1989 - December 1991

ORGANIZATIONS:

University of Sydney, School of Biological Sciences
NSW 2006

Murdoch University, School of Biological and Environmental Sciences
Murdoch, WA 6150

PROJECT LEADERS:

Dr R.T. Hinde (02) 6924035
Dr M.A. Borowitzka (09) 3322211

CONTACT OFFICER:

Dr R.T. Hinde

EXPENDITURE:

$22,024 (this year)

MANPOWER:

1.30 (this year)

EXTERNAL SUPPORT:

ARC - $21,424

OBJECTIVES

To establish:
1. the role of sponges with endosymbiotic algae in the productivity and food chains of coral reefs.
2. The effects of environmental factors on the growth of these sponge-alga associations.
3. Their production of chemicals of potential medical importance.

METHODOLOGY

1. Use of transects and quadrats to estimate abundance and map distribution of sponges.
2. Use of oxygen electrodes and underwater respirometers to measure sponge respiration, photosynthesis and net production.
3. Use of $^{14}CO_2$ as tracer to measure translocation of metabolites from the algae to the sponges.
4. Chemical analyses of secondary metabolites.

CO-ORDINATION WITH OTHER PROJECTS

Chemical analyses will be undertaken by Dr R. Quinn, School of Science, Griffith University, and will form part of his wider study of marine natural products.

LOCALITIES: One Tree Island; Capricorn-Bunker Group

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Coral reefs/Food chains/Sponges/Algae/Interspecific relationships/Environmental effects/

[UNISYD168]

See also:

75* Fringing reef development in the south central Great Barrier Reef.
96** Systematics and ecology of tropical Australian marine macroalgae.

98* Taxonomy and biology of estuarine algae.
99 Systematic and ecological studies on the marine algae of Queensland.
100 Systematics and ecological studies on the algae of the Southern Great Barrier Reef.
110** Feeding and breeding ecology of seabirds.
117* Tropical marine microbiology studies.
119 Times of evolutionary divergence of species and subspecies of the Indo West-Pacific fish family Siganidae.
123* Biology of holoplanktonic molluscs of Australian waters.
132 Phylogeny and systematics of phyllidiid nudibranchs.
133* Taxonomy and ecology of benthic invertebrates from Heron Island, Queensland.
136 Taxonomy and ecology of larval and adult fishes.
148 Ecophysiological and nutritional aspects of symbioses between algae and sponges.
149 Eco-physiological aspects of symbioses between algae and sponges.
320 Effects of dredging and ocean spoil disposal on marine biota.
324 Methods for the re-establishment of hard corals in denuded reef systems.
329* Surveillance of reefs affected by *Acanthaster planci* outbreaks by aerial survey.

See:

133* Taxonomy and ecology of benthic invertebrates from Heron Island, Queensland.

286* Studies on north Queensland fishes.

266 Experimental and clinical studies of mannitol in the treatment of ciguatera.

January 1989 - June 1991

ORGANIZATION:
Queensland Department of Primary Industries, Fisheries Research Branch
Southern Fisheries Research Centre
PO Box 76
Deception Bay, Qld 4508

PROJECT LEADER:
Dr R.J. Lewis (07) 2031444

EXTERNAL SUPPORT:
FIRTA - $32,000 (January - June 1989)

OBJECTIVE

Assess the clinical efficacy of mannitol in the treatment of ciguatera in Australia. Determine experimentally the interactions between ciguatoxin and mannitol. Use mannitol as a 'lead' in the search for other drugs useful in the treatment of ciguatera.

METHODOLOGY

Clinical studies will involve administration of mannitol i.v. into victims of ciguatera. *In vivo* and *in vitro* studies using animal models will be undertaken.

STATUS

Preliminary clinical studies indicate a high dose of mannitol can permanently reverse the effects of ciguatera. The project commences in January, 1989.

GEOGRAPHIC REGIONS: Q,R

MAJOR DESCRIPTORS: Ciguatera/Ciguatoxin/Pharmacology/Therapy/

[QDPI—074]

267 Toxicity of the dinoflagellate *Gambierdiscus toxicus* and the development of ciguatera outbreaks.

ORGANIZATION:
Queensland Department of Primary Industries, Fisheries Research Branch
Southern Fisheries Research Centre
PO Box 76
Deception Bay, Qld 4508

PROJECT LEADERS:
Dr N.C. Gillespie (07) 2246918
Dr R.J. Lewis (07) 2031444
Mr M. Holmes (07) 2031444

CONTACT OFFICER:
Mr M. Holmes

EXPENDITURE:
$25,600 (this year), $72,000 (all years)

MANPOWER:
2.00 (this year), 5.00 (all years)

EXTERNAL SUPPORT:
FIRTA - $22,600

OBJECTIVE

To determine the involvement of *Gambierdiscus toxicus* and other benthic dinoflagellates in the biogenesis of ciguatera.

METHODOLOGY

Monoclonal strains of *G. toxicus* and other benthic dinoflagellates isolated from Queensland and French Polynesia are being grown in laboratory culture. Mass cultures of these strains are extracted and assayed for ciguatoxin and mactotoxin using column chromatography and mouse bioassay. Wild cells are also harvested and extracted and assayed for these toxins.

STATUS

Different forms of mactotoxin have been characterised from Queensland and French Polynesian strains of *G. toxicus*. Recent results indicate that ciguatoxin production may also be strain dependent. A water-soluble toxin but no ciguatoxin was detected from mass cultures of the benthic dinoflagellate *Ostreopsis siamensis* isolated from Harvey Bay.

GEOGRAPHIC REGIONS: Q,R

MAJOR DESCRIPTORS: Ciguatera/Ciguatoxin/Phytoplankton/Biological poisons/Toxicity/

TAXONOMIC TERMS: Gambierdiscus toxicus; Osteopsis siamensis

See also:

265 The role of sponges in the ecology of coral reefs.

See:

281 Low Isles, Great Barrier Reef: a biological and historical survey.

268 Monitoring and assessment of management policies in the northern prawn fishery.

July 1985 - July 1988

ORGANIZATION:
Australian Bureau of Agricultural and Resource Economics
GPO Box 1563
Canberra, ACT 2601

PROJECT LEADERS:
Mr D. Collins (062) 754747
Mr K. Kloessing (062) 754713

CONTACT OFFICER:
Mr S. Pascoe (062) 754713

EXPENDITURE:
$19,357 (this year), $19,357 (all years)

EXTERNAL SUPPORT:
FIRTA - $21,497

OBJECTIVE
To develop practical methodologies which will enable the timely and cost effective economic assessment of the economic status of the fishery and to determine the effectiveness of current and proposed policy measures.

METHODOLOGY
Determination of boat groupings for sampling procedures.
Identification of key variables to allow monitoring of the effects of management on a regular basis.
Formulation and refinement of economic model.
Development of cost effective data collection procedure.
Simulation of economic behaviour under various regulatory devices.

GEOGRAPHIC REGIONS: E,Y,C,R

MAJOR DESCRIPTORS: Fishery management/Fishery economics/Fishery policy/Prawn fisheries/

[BAE—002]

269 Economic characteristics and significance of the Great Barrier Reef region shell "trade".

January 1986 - December 1988

ORGANIZATIONS:
Great Barrier Reef Marine Park Authority
PO Box 1379
Townsville, Qld 4810
Griffith University, School of Australian Environmental Studies (Subcontract)
Nathan, Qld 4111

PROJECT LEADERS:
Ms S. Driml (077) 818811
Ms K. Herbert (07) 2757111

CONTACT OFFICER:
Ms S. Driml

EXPENDITURE:
$2,738 (all years)

OBJECTIVE
To document and value the 'trade' in shells and artifacts in North Queensland both in terms of world 'trade' and commercial and amateur collection.

METHODOLOGY
Personal interviews with shell collectors, retailers and wholesalers and subsequent data analysis.

STATUS
A final report has been received and information incorporated into a project on Great Barrier Reef shell collecting by B. Barnett.

Completed Project - This project will remain in the computerized Register for another 5 years but will not be included in future issues of the Compendium.

CO-ORDINATION WITH OTHER PROJECTS
Interviews have been undertaken in cooperation with an overall study on shell collecting on the reef.

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Shells/Economic analysis/Trade/

[GBRMPA179]

See also:

251* Ecology of marine parasites.
318 Oyster project.

270 Attitudes of tourists to North Queensland with emphasis on the Great Barrier Reef.

May 1986 - June 1989

ORGANIZATIONS:

Great Barrier Reef Marine Park Authority
PO Box 1379
Townsville, Qld 4810

Griffith University (Subcontract)
Nathan, Qld 4111

PROJECT LEADERS:

Ms S. Driml (077) 818811
Mr F. Vanclay (07) 2757111

CONTACT OFFICER:

Ms S. Driml

EXPENDITURE:

$20,000 (all years)

MANPOWER:

0.80 (all years)

OBJECTIVE

To undertake a study of attitudes of tourists in North Queensland to selected aspects of holidays, and in particular to reef-related issues.

METHODOLOGY

Develop a questionnaire to be administered by personal interview. Select a sample of visitors to North Queensland and the Great Barrier reef for interview, undertaking interviews in the high and low season. Analyse using standard statistical methods.

STATUS

A final version of the report has been produced and is being edited for publication.
The survey was undertaken in conjunction with another GBRMPA project, the study of socio-economic consequences of major populations of crown-of-thorns starfish.

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Recreation/Sociological aspects/Coral reefs/Surveys/

[GBRMPA163]

271* Dive tourism study.

October 1987 - April 1988

ORGANIZATION:

James Cook University of North Queensland,
Centre for Studies in Travel and Tourism
Post Office
James Cook University, Qld 4811

PROJECT LEADERS:

Dr D.I. McSwan (077) 814750
Mr S. Jardine (077) 814750

CONTACT OFFICER:

Mr S. Jardine

EXPENDITURE:

$12,000 (this year)

EXTERNAL SUPPORT:

Great Barrier Reef Marine Park Authority - $2,000
Ansett Airlines
Australian Airlines

OBJECTIVES

1. To detail the historical background and development of the dive industry in Queensland.
2. To define the current status, in terms of its characteristics, size and value and develop a resource inventory.
3. To investigate future directions for the dive industry particularly in terms of developing marketing strategies aimed at maximizing the potential growth of the industry.

METHODOLOGY

Survey all Queensland dive operators via questionnaire and interview. Establish database. Report and recommend.

STATUS

Developmental stage at 10-2-88. Contact Stuart Jardine at CSTT for updates and access.

Completed Project - This project will remain in the computerized Register for another 5 years but will not be included in future issues of the Compendium.

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Diving industry/Economics/Sociological aspects/Resource management/Recreation/

[JAMESC109]

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272 **Major survey research programme (M.S.R.P.) - Supplementary Barrier Reef Island survey.**

July 1982 -

ORGANIZATIONS:

Queensland Tourist and Travel Corporation
Research and Regional Development Division
GPO Box 328
Brisbane, Qld 4001

James Cook University of North Queensland,
Centre for Studies in Travel and Tourism
Townsville, Qld 4811

PROJECT LEADERS:

Ms J. Muntz (07) 8335415
Mr M. Gibbings (07) 3773507

CONTACT OFFICER:

Ms M. Wellwood (07) 8335400

OBJECTIVE

To obtain information on the characteristics (demographic and socioeconomic), activities, opinions and expenditure patterns of visitors (international, interstate and intrastate) staying at least one night in commercial accommodation on islands in the Great Barrier Region. The Barrier Reef Islands survey is a supplement to the main survey of the MSRP which also covers Barrier Reef Island Resorts. The purpose of this additional survey is to provide a sufficiently large sample to enable reliable estimation of visitor characteristics for the separately defined Barrier Reef Island Region. The 1988/89 survey will include the addition of a daytripper survey and visitors staying in non-commercial accommodation. The objective being to provide a complete and reliable survey of tourist activity throughout Queensland.

METHODOLOGY

This supplementary survey of Barrier Reef Islands covers all islands on which there are resorts - from Heron Island in the south up to and including Lizard Island. Only accommodation units in establishments offering hotel or motel type facilities and services are covered in the survey.
The sample design employed is a replicated sample with stratification by season and by size of resort. The survey is administered with a self-enumeration questionnaire.

STATUS

This supplementary survey commenced in December 1982 and the results of the first seven (7) months period to 30 June 1983 have been weighed up to represent results for the full year July 1982 to June 1983. Results are also available for the twelve (12) quarters and three (3) full year periods between July 1983 and 30 June 1987, and the survey is currently continuing throughout the 1987/1988 year. The type of data that is available by quarter and per annum is as follows: total visitors, groups and nights, visitor activity, trip purpose, visitor origin, main attractions, information sources, recency of visit, main means of transport, rating of selected services, recommendations, expenditure, trip characteristics, age and sex of visitors and size of group.

LOCALITIES: Heron Island; Lizard Island

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Recreation/Sociological aspects/Surveys/Economics/

[QTTC—001]

See also:

301 Norman Reef environmental study.

273** Australian Tuna Fisheries logbook programmes.

ORGANIZATIONS:
Department of Primary Industries and Energy,
Australian Fisheries Service
Tuna Section,
Canberra, ACT 2600
Department of Primary Industries and Energy,
Fisheries Resources Branch
Bureau of Rural Science,
Canberra, ACT 2600

PROJECT LEADERS:
Mr B.J. Scott (062) 725180
Dr M. Williams (062) 725177

CONTACT OFFICER:
Mr B.J. Scott

OBJECTIVES

To monitor catch, effort and location of:
1. Surface pole and live bait/purse seine activities for southern bluefin tuna;
2. Domestic longline activities for tunas and billfishes, especially yellowfin tuna;
3. Japanese longline activities in the Australian fishing zone for tunas and billfishes;
- by a system of logbooks and, for Japanese fisheries, also routine radio reports,
- as a basis for research and management programs on tuna and billfish stocks and fisheries.

METHODOLOGY

Logbooks, formatted for direct computer entry of data are distributed to all vessels operating in the tuna fisheries described and, as resources permit, are gathered by special liaison staff with the major role of maintaining fishermen's cooperation with the program. Data are hand edited by these staff who where possible, also undertake some of the subsequent computer editing, to ensure that data quality is maintained along the processing chain. A special, independent logbook 'Paper audit trail' is maintained for the southern bluefin tuna fishery to administer the system of individual transferrable quotas operating, and check that quota limits are observed.

STATUS

The system maintains one established in the early 1960's by CSIRO Division of Fisheries Research for southern bluefin tuna. Fishermen's cooperation has risen and fallen generally in relation to the extent of field liaison maintained. Limited resources this year and the development of the domestic yellowfin tuna longline fishery may result in a deteriorating response rate. Establishment in 1979 of the Australian 200 mile fishing zone provided a requirement to monitor foreign tuna fishing operations as access fees are directly linked to level of catches.
Edited data are stored on the (computerised) Australian Fishing Zone Information System. Access is restricted to ensure confidentiality of individual fishermen's data but summary tabulations can be developed.

CO-ORDINATION WITH OTHER PROJECTS

The Australian Fishing Zone Information System, maintained by the Department of Primary Industry by support from CSIRO Division of Fisheries Research, contains data on other domestic and foreign fisheries of the oceanic 200 mile Australian Fishing Zone.

GEOGRAPHIC REGIONS: J,R,Z,Q,P,N,B,T,S,G,D,W,E,I
MAJOR DESCRIPTORS: Tuna fisheries/Fishery management/Catch statistics/Logbooks/
TAXONOMIC TERMS: Thunnus albacares; Thunnus maccoyii

[DPI—009]

274 New technology for assessment of larval fish stocks.

July 1987 - August 1989

ORGANIZATION:
Griffith University, Division of Australian
Environmental Studies
Kessels Road
Nathan, Qld 4111

PROJECT LEADER:
Dr P. Doherty (07) 2757408

EXTERNAL SUPPORT:
FIRTA - $55,000 (1987-89)

OBJECTIVES

Conventional sampling techniques underestimate the abundance of mature ichthyoplankton and hence overestimate larval mortality.
A submersible, automated light-trap has been shown to be an effective method of sampling these older larvae and the technique is being developed into a general purpose tool for fisheries investigations.

CO-ORDINATION WITH OTHER PROJECTS

Field trials of these devices have been conducted in collaboration with the CSIRO, Division of Fisheries and the Australian Institute of Marine Science.

LOCALITIES: Lizard Island; Moreton Bay

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Fish larvae/Stock assessment/Ichthyoplankton/Samplers/

[GRIFFI013]

275 Culture of giant clams (Tridacnidae) for food and restocking of tropical reefs.

July 1984 - January 1992

ORGANIZATIONS:

James Cook University of North Queensland
Townsville, Qld 4811

Australian Institute of Marine Science
PMB 3, MSO
Townsville, Qld 4810

Oonoomba Veterinary Laboratory
PO Box 1085
Townsville, Qld 4810

PROJECT LEADERS:

Assoc Prof J.S. Lucas (077) 814412
Dr J.A.H. Benzie (077) 789211
Dr D. Hoffman (077) 782688

CONTACT OFFICER:

Mr J. Armstrong (077) 814819

EXPENDITURE:

$276,281 (this year), $1,512,333 (all years)

MANPOWER:

6.00 (this year), 30.00 (all years)

EXTERNAL SUPPORT:

ACIAR - $1,512,333

OBJECTIVES

1. To undertake giant clam farming trials with Pacific fishing villages.
2. To determine environmental and culture conditions which optimize growth and survival of cultured clams.
3. To obtain production data and costs for giant clam culture.
4. To assist Pacific Island nations with stock assessments, development of management strategies, training, seed clams and appropriate technology for culturing giant clams.
5. To investigate the genetics of giant clams.
6. To study the organisms associated with normal and abnormal giant clams.
7. To produce a manual on giant clam stock assessment and mariculture.

METHODOLOGY

A wide range of laboratory and field techniques will be used to pursue the various aspects of this large project. For example, starch gel electrophoresis for studies of allozymes will be used for the populaton genetics studies.

STATUS

The first three-year phase of the project extended from 1984 to 1987. It was reviewed by the funding agency, Australian Centre for International Agricultural Research, and recommended for renewal. Since 1987 the Project has been on bridging finance, pending the acceptance of a replacement project proposal to ACIAR. An International Giant Clam Workshop was held at James Cook University in April 1988 to review the results of the first three years of research and consider the needs for further research on giant clams.

CO-ORDINATION WITH OTHER PROJECTS

This project collaborates with giant clam research at the Micronesian Mariculture Demonstration Center, Palau, and at the ICLARM Coastal Aquaculture Centre in the Solomon Islands.

GEOGRAPHIC REGIONS: R,P

MAJOR DESCRIPTORS: Clam culture/Commercial species/Growth/Stocking (organisms)/Fishery economics/

TAXONOMIC TERMS: Tridacnidae

[JAMESC124]

276 Ocean-nursery and grow-out phases of giant clam mariculture.

July 1987 - June 1990

ORGANIZATION:
James Cook University of North Queensland
Townsville, Qld 4811

PROJECT LEADER:
Assoc Prof J.S. Lucas (077) 814412

CONTACT OFFICER:
Mr J. Barker (077) 814413 (Research Officer)

EXPENDITURE:
$56,130 (this year), $114,778 (all years)

MANPOWER:
1.10 (this year), 2.20 (all years)

EXTERNAL SUPPORT:
FIRDC - $114,778

OBJECTIVES

1. To develop methods for commercially culturing juvenile giant clams through their ocean-nursery and grow-out phases. These methods are to be appropriate to the Great Barrier Reef and other northern Australian environments.
2. To assess the suitability of various localities in northern Australia for giant clam mariculture.

METHODOLOGY

Various methods of protecting juvenile giant clams from predators, e.g. lines, covers, exclosures, are being assessed for their effectiveness and economics of materials and maintenance time. Sibling clams have been placed at various localities along the Great Barrier Reef, from Lady Musgrave Island to Albany Island, and at Groote Eylandt. Their growth and survival are being studied and data collected on temperature and light regime.

STATUS

The clams have been established at various localities and a number of new culture techniques have been set up and are now being monitored.

CO-ORDINATION WITH OTHER PROJECTS

This project is closely coordinated with an ACIAR-funded project on giant clam mariculture.

LOCALITIES: Lady Musgrave Island; Albany Island; Groote Eylandt
GEOGRAPHIC REGIONS: Y,C,J,R
MAJOR DESCRIPTORS: Clam culture/Juveniles/Growth/Nursery grounds/Commercial species/
TAXONOMIC TERMS: Tridacnidae

[JAMESC123]

See also:

90* Biological control of bopyrid parasites of commercial prawns using liriopsid hyperparasites.
251* Ecology of marine parasites.

277 Survey of molluscs of the eastern Australian continental slope and Tasman Basin.

ORGANIZATION:
Australian Museum
6-8 College Street,
Sydney, NSW 2000

PROJECT LEADER:
Dr W.F. Ponder (02) 3398120

EXPENDITURE:
$4,000 (this year), $30,000 (all years)

MANPOWER:
0.30 (this year), 3.00 (all years)

OBJECTIVE
To survey the benthic molluscs living on the continental slope of eastern Australia and in the Tasman Basin.

METHODOLOGY
Dredging and trawling from oceanographic vessels. Material of molluscs and other benthic animals obtained distributed to specialists world-wide.

STATUS
Sampling off Queensland, Tasmanian and NSW coasts from HMAS 'Kimbla', RV 'Franklin' and FRV 'Kapala' has revealed a rich fauna. Considerable numbers of additional species are obtained on every expedition suggesting that the fauna is still largely unknown.

CO-ORDINATION WITH OTHER PROJECTS
NSW State Fisheries benthic fish and prawn surveys have provided considerable input.

GEOGRAPHIC REGIONS: R,Q,N,B,T
SHIP TIME REQUIREMENTS: 10 days
MAJOR DESCRIPTORS: Molluscs/Surveys/
TAXONOMIC TERMS: Mollusca

[AUSMUS016]

278 A preliminary review of the effects of trawling in the Great Barrier Reef region.

June 1987 - October 1988

ORGANIZATIONS:
Great Barrier Reef Marine Park Authority
PO Box 1379
Townsville, Qld 4810

CSIRO, Division of Fisheries (Subcontract)
GPO Box 1538
Hobart, Tas 7001

PROJECT LEADERS:
Dr W. Craik (077) 818811
Dr I. Poiner (07) 2868222
Dr K. Sainsbury (002) 206222

CONTACT OFFICER:
Dr W. Craik

EXPENDITURE:
$5,824 (all years)

MANPOWER:
0.10 (all years)

OBJECTIVES
To review existing data.
To review management approaches.
To review research approaches.
To identify research needs.

METHODOLOGY
Desk study, involving literature review and discussions with scientists and institutions involved in research related to trawling and benthic communities. Assessment of information as it relates to trawling in the Great Barrier Reef region.

STATUS
Report completed. Publication in progress.

Completed Project - This project will remain in the computerized Register for another 5 years but will not be included in future issues of the Compendium.

GEOGRAPHIC REGION: R
MAJOR DESCRIPTORS: Coral reefs/Environmental impact/Trawling/Research programmes/Benthos/

[GBRMPA167]

279 Collection and analysis of amateur fishing data.

February 1989 -

ORGANIZATIONS:

Great Barrier Reef Marine Park Authority
PO Box 1379
Townsville, Qld 4810

Schuster, Dr M.Z.
54 Glenwood St
Chelmer, Qld 4068

PROJECT LEADERS:

Mr S. Hillman (077) 818811
Dr M.Z. Schuster (07) 3793569

CONTACT OFFICER:

Mr S. Hillman

EXPENDITURE:

$11,700 (this year), $15,625 (all years)

OBJECTIVES

1. To make a preliminary analysis of data holdings at Great Barrier Reef Marine Park Authority and identify gaps in these holdings and collect the missing information so that the data set can be brought up to date. To arrange for the regular provision of data from fishing clubs.
To construct a database of the collated information on the central GBRMPA computer in collaboration with GBRMPA staff. To provide some routine graphical outputs of the data based on PC software.
To provide an analysis of the catch per unit effort over time by species groups and location and a report suitable for publication. To arrange for feedback to the clubs providing information.

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Sport fishing/Marine parks/Databases/Catch-effort/

[GBRMPA199]

280 CORSPEX Biology - analysis of plankton samples from CORSPEX '87.

April 1989 -

ORGANIZATIONS:

Great Barrier Reef Marine Park Authority
PO Box 1379
Townsville, Qld 4810

James Cook University of North Queensland
PO
James Cook University, Qld 4811

PROJECT LEADERS:

Mr S. Hillman (077) 818811
Dr B. Willis (077) 814111
Dr J. Oliver

CONTACT OFFICER:

Mr S. Hillman

EXPENDITURE:

$4,891 (this year), $4,891 (all years)

OBJECTIVE

To complete sample sorting and data analysis for plankton samples collected during CORSPEX '87.

STATUS

Analysis of samples is complete.

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Plankton surveys/Planktonology/

[GBRMPA185]

281 Low Isles, Great Barrier Reef: a biological and historical survey.

March 1988 -

ORGANIZATIONS:

Great Barrier Reef Marine Park Authority
PO Box 1379
Townsville, Qld 4810

Reef Research and Information Services
PO Box 5348
Townsville MC, Qld 4810

PROJECT LEADERS:

Mr S. Hillman (077) 818811
Mr D.A. Fisk (077) 726519

CONTACT OFFICER:

Mr S. Hillman

EXPENDITURE:

$2,000 (this year), $4,000 (all years)

EXTERNAL SUPPORT:

Bicentennial Funding

OBJECTIVES

1. To survey benthos (macro) to determine broad distribution patterns.
2. To re-survey sites previously surveyed (1929-86).
3. To produce information booklet "Human and Biological History of Low Isles".

LOCALITY: Low Isles
GEOGRAPHIC REGION: R
MAJOR DESCRIPTORS: Biological surveys/Benthos/Coral reefs/Cays/Historical account/

[GBRMPA189]

282 Monitoring replenishment areas: coral trout survey techniques.

April 1983 -

ORGANIZATIONS:

Great Barrier Reef Marine Park Authority
PO Box 1379
Townsville, Qld 4810

Queensland National Parks and Wildlife Service
Department of Environment and Conservation
PO Box 155
Brisbane North Quay, Qld 4002

PROJECT LEADERS:
Dr W. Craik (077) 818811
Mr K. Beinssen

CONTACT OFFICER:
Dr W. Craik

EXPENDITURE:
$16,000 (all years)

OBJECTIVES

To monitor coral trout communities in two replenishment areas Boult, North, Heron, Wreck and Llewellyn (restricted activities) and North West reefs, Capricornia Section.
To monitor and assess the effects of fishing on coral trout following the re-opening of reefs to fishing.
To evaluate effectiveness of reef closures as a management tool.

METHODOLOGY

Survey of 6 reefs (17 transects) before closure and at 6 monthly intervals thereafter, using intensive scuba search technique of surveying coral trout.
Results assessed at end of each survey and written up on comparative basis.
Reefs to be surveyed: Boult, North, Wreck, Llewellyn, North West, Heron.
Survey of Boult Reef in 1987 upon re-opening to fishing.

STATUS

Survey occurred in June 1983, just prior to closure of replenishment areas, and then at 6-monthly intervals, and again in 1987 upon re-opening of area. Report on Boult Reef in preparation.

LOCALITY: Boult Reef
GEOGRAPHIC REGION: R
MAJOR DESCRIPTORS: Stock assessment/Reef fisheries/Fishery management/Monitoring/Fishery surveys/
TAXONOMIC TERMS: Plectropomus leopardus

[GBRMPA049]

283 Reef fish tagging in the Capricornia Section of the Great Barrier Reef Marine Park.

November 1980 -

ORGANIZATIONS:

Great Barrier Reef Marine Park Authority
PO Box 1379
Townsville, Qld 4810

Queensland National Parks and Wildlife Service
Department of Environment and Conservation
PO Box 155
Brisbane North Quay, Qld 4002

Giddins, Mr R.
C/- School of Biological Sciences,
James Cook University,
Townsville, Qld 4811

PROJECT LEADERS:
Dr W. Craik (077) 818811
Mr D. Savage
Mr R. Giddins

CONTACT OFFICER:
Dr W. Craik

EXPENDITURE:
$32,500 (all years)

MANPOWER:
0.45 (all years)

OBJECTIVES

To determine the extent of movement of reef fishes, around a reef and between reefs.
To obtain length- frequency data on reef fishes.

METHODOLOGY

Reef fishes were caught by rod and line, tagged and released, and species, the area of capture, length of fish and date were recorded. Fishermen catching tagged fish were asked to return the tag with date and place of capture for $5.00 reward. Initial and subsequent recaptures were recorded to see if fish had moved. Other data (length, frequency, catch and effort) were recorded and analysed.

STATUS

Analysis complete and final report in preparation.

CO-ORDINATION WITH OTHER PROJECTS

This project relates to a coral trout survey project in which populations of coral trout are evaluated at different reefs.

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Reef fish/Coral reefs/Migrations/Tagging/

[GBRMPA020]

284 Review of published and unpublished information on reef fishes of commercial and recreational fishing interests in the Great Barrier Reef region.

December 1988 -

ORGANIZATIONS:

Great Barrier Reef Marine Park Authority
PO Box 1379
Townsville, Qld 4810

James Cook University of North Queensland
Post Office
James Cook University, Qld 4811

Australian Institute of Marine Science
PMB No. 3
Townsville MC, Qld 4810

PROJECT LEADERS:

Dr W. Craik (077) 818811
Prof J.H. Choat (077) 814111
Dr G. Russ
Dr D.McB. Williams (077) 789211

CONTACT OFFICER:

Dr W. Craik

EXPENDITURE:

$26,008 (this year), $26,008 (all years)

OBJECTIVES

1. To produce a review of studies (published, unpublished and work in progress) synthesising information on reef fishes of commercial and recreational fishing importance in the Great Barrier Reef region.
2. To recommend and prioritise research to fill gaps identified in existing information necessary for management.

STATUS

Surveys sent to appropriate researchers in the study field. Database production advanced.

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Reef fish/Commercial species/Sport fishing/Literature reviews/Bibliographic information/

[GBRMPA190]

285 Traditional fisheries knowledge in northern Australia.

May 1985 - March 1989

ORGANIZATIONS:

Great Barrier Reef Marine Park Authority
PO Box 1379
Townsville Qld 4810

Department of Primary Industries and Energy,
Australian Fisheries Service
Barton, ACT 2600

PROJECT LEADERS:

Dr D.W. Kinsey (077) 818811
Dr R. Bain (062) 725591

CONTACT OFFICER:

Dr L. Zann (077) 818811

EXPENDITURE:

$0 (this year), $3,413 (all years)

OBJECTIVES

To review information on Aboriginal and Torres Strait Islander fishing and marine hunting in northern Australia.
To assist in providing guidelines to agencies responsible for management of traditional fisheries.
To identify agenda of appropriate research.

METHODOLOGY

Consult relevant individuals and agencies to establish agenda, and speakers for a workshop. Arrange contributions from Aborigines and Torres Strait Islanders, antropologists, marine scientists, state and Commonwealth fisheries agencies etc. Conduct the workshop and publish the proceedings.

STATUS

Published as GBRMPA Workshop Proceedings in March 1989.

Completed Project - This project will remain in the computerized Register for another 5 years but will not be included in future issues of the Compendium.

GEOGRAPHIC REGIONS: R,C,Y,J

MAJOR DESCRIPTORS: Fishery management/Fishing operations/Hunting/Aborigines/Subsistence fisheries/Sociological aspects/Conferences/

[GBRMPA132]

286* **Studies on north Queensland fishes.**

ORGANIZATION:

James Cook University of North Queensland,
Department of Zoology
Townsville, Qld 4811

PROJECT LEADER:

Dr N.E. Milward (077) 814193

EXPENDITURE:

$2,000 (this year), $9,000 (all years)

MANPOWER:

0.10 (this year), 0.45 (all years)

OBJECTIVE

To survey and analyse the distribution and abundance of fishes in north Queensland waters, and to collect basic biological information of importance for their rational exploitation and management.

METHODOLOGY

Sampling, mainly by trawling from the R.V. *James Kirby* and supplemented by other methods, on a station grid system extending from the shore to the outer reefs. Samples are analysed on board boat for species present, numbers and size ranges, and series of specimens retained for later examination of gut contents and reproductive condition. Data are being utilised for determination of growth rates, trophic relationships, breeding seasons, and other aspects of population dynamics.

STATUS

Considerable data have been obtained on fish occurrences and distributions, numbers, and length/weight frequencies, and aspects of the biology of the most common species. These data are being used in the compilation of an annotated check-list and to form the bases of publications on the tropical ichthyofauna relevant to the north-eastern Australian trawl fishery.

GEOGRAPHIC REGION: R

SHIP TIME REQUIREMENTS: 12 days. (shared with other research and teaching cruises.)

MAJOR DESCRIPTORS: Life history/Fishery surveys/Check lists/Fishery biology/

[JAMESC013]

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287 **Application of remote-sensing techniques for the assessment of fish habitat areas.**

January 1975 - December 1988

ORGANIZATION:

Queensland Department of Primary Industries
Estuarine and Foreshore Management Section
PO Box 46
Brisbane, Qld 4001

PROJECT LEADERS:

Mr D. Mayer (07) 2244368
Dr B.R. Pollock (07) 2246892

CONTACT OFFICER:

Mr D. Mayer

EXPENDITURE:

$30,000 (this year), $200,000 (all years)

MANPOWER:

3.50 (this year), 30.00 (all years)

OBJECTIVE

To document changes in estuarine conformation; macrophytic vegetation and catchment land-use; historical data and analysis of current remote-sensing information. To relate such base-line data to the habitat needs of commercially and recreationally important fin fish, crustaceans and molluscs. And to store and retrieve data, as necessary, for associated research on fisheries.

METHODOLOGY

Acquisition of ground truth and digitization of data, maps and air photographs to be compatible with digital output of remote-sensing imagery. Analysis of field data and collated base-line data to enable classification of streams and estuaries for inventory preparation.

STATUS

The feasibility of remote sensing techniques for preparation of a resource-based data bank has been established by the Department. A methodology has been developed to relate the data base and output to estuarine management strategies.
Site specific studies show that expansion of the programme to embrace State-wide regional surveys is warranted.

Completed Project - This project will remain in the computerized Register for another 5 years but will not be included in future issues of the Compendium.

CO-ORDINATION WITH OTHER PROJECTS

(1) Investigations by Q. Water Quality Council and Beach Protection Authority.
(2) Regional and national ecological surveys.

GEOGRAPHIC REGIONS: C,Q,R
SHIP TIME REQUIREMENTS: 50 days
MAJOR DESCRIPTORS: Fishery resources/Stock assessment/Remote sensing/Habitat/Estuaries/

[QDPI—019]

288 Stream and estuarine inventory and classification in relation to fish populations.

January 1975 - December 1988

ORGANIZATION:
Queensland Department of Primary Industries
Estuarine and Foreshore Management Section,
P.O. Box 46,
Brisbane, Qld. 4000

PROJECT LEADER:
Dr J. Beumer (07) 2246903

CONTACT OFFICER:
Mr D. Mayer (07) 2244368

OBJECTIVES

1. The preparation of a classification and inventory of stream and estuarine systems in Queensland for fisheries purposes, and the co-ordination of the results with land-use and management practices in catchments and coastal areas.
2. The preparation of management strategies based upon co-ordinated resources-based planning for the maintenance or enhancement of fisheries.

METHODOLOGY

Using a data-base on estuarine conformation, and biotic and abiotic factors likely to affect fisheries, a priority ranking is established to define areas capable of long-term conservation, areas of multiple use for purposes devoted to alternative use e.g. urban centres. Fisheries management strategies are then related to the present day inventory and future conservation of resources.

STATUS

A methodology has been established for the priority ranking of estuarine systems, based on the needs of fisheries.
The extension of site specific studies to provide a State wide management programme and to serve as base line data for assessment of the environmental impact of changes in land-use coastal development is an on-going function of this project team.

Completed Project - This project will remain in the computerized Register for another 5 years but will not be included in future issues of the Compendium.

CO-ORDINATION WITH OTHER PROJECTS

1. Investigations by Q. Water Quality Council and Beach Protection Authority.
2. Regional and national ecological surveys.

GEOGRAPHIC REGIONS: C,Q,R

SHIP TIME REQUIREMENTS: 20 days

MAJOR DESCRIPTORS: Fishery resources/Estuaries/Rivers/Inventories/Classification/Fishery management/

[QDPI—020]

289* **Studies on the trawl fishery for red-spot king prawns (*Penaeus longistylus*) in the Great Barrier Reef region.**

June 1984 -

ORGANIZATION:
Queensland Department of Primary Industries, Fisheries Research Branch
GPO Box 46
Brisbane, Qld 4001

PROJECT LEADER:
Mr M. Dredge (071) 794155

EXPENDITURE:
$118,000 (this year), $460,000 (all years)

MANPOWER:
7.00 (this year), 25.00 (all years)

EXTERNAL SUPPORT:
FIRTA - $315,000 (3 years)
GBRMPA - $79,000 (3 years)

OBJECTIVES

To obtain data on the life cycle of *P. longistylus*.
To obtain data on the by-catch taken in the existing fishery, and compare by-catch fauna with described reef and inter reef faunas.
Describe population parameters of *P. longistylus* from catch/effort data and tag data for incorporation in production/yield per recruit models.

METHODOLOGY

Estuarine, reef top and near reef habitats have been sampled with trawl gear to demonstrate seasonal and spatial distribution of *P. longistylus*. Reproductive cycle of the stocks has been monitored for two years, and tag data have been used to demonstrate growth, movement and natural mortality of adults. Log books are used to show trends in relative abundance of adults in the stock. By-catch for the major fishing grounds has been monitored for two years.

STATUS

Field sampling has been completed, and data are now being analysed and written up. Approximately 5,000 adult females have been examined for gonad development and condition, and results from these examinations are stored, via a commercial data-base, on a microcomputer. Abundance and size composition data of prawns taken in 350 deep water sample trawls, 100 reef top trawls and 600 estuarine samples are also stored on a micro, and tag data - some 600 returns from 4,000 releases - are currently being worked up.
Data on the fishery will be collected as an ongoing project. By-catch is being analysed in terms of community association.

GEOGRAPHIC REGION: R

SHIP TIME REQUIREMENTS: 30 days

MAJOR DESCRIPTORS: Prawn fisheries/Life cycle/Stock assessment/Fishery data/By catch/

TAXONOMIC TERMS: Penaeus longistylus

[QDPI—022]

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290 **Induced breeding in barramundi, *Lates calcarifer*.**

October 1985 -

ORGANIZATION:
Queensland Department of Primary industries, Northern Fisheries Research Centre
PO Box 5396
Cairns Mail Centre, 4871

PROJECT LEADER:
Mr R.N. Garrett (070) 515588

EXPENDITURE:
$10,800 (this year), $25,800 (all years)

MANPOWER:
1.50 (this year), 4.50 (all years)

OBJECTIVE

To develop normally- and environmentally-mediated breeding techniques in captive broodstock fishes appropriate to the mass production of fingerlings.

METHODOLOGY

The integrated development and application of controlled reproduction systems for captive broodstock fishes appears a necessary technological foundation for large-scale fish culture operations in Queensland. The development programme involves two concurrent lines of investigation. Firstly, an identified suite of gonadotropically- active compounds (including several synthetic hypothalamic hormones) that show promise as potent and cost-effective spawning agents is being tested, with particular emphasis on potentiation assessment and hormone dose-response profiles. The added effect of dopamine antagonists and catecholaminergic drugs is also being addressed. Secondly, there is a progressive effort to establish the environmental and biological regimes most appropriate for extended high quality fertilized egg production from broodstock barramundi.

STATUS

Current research focuses on both hormonally- and environmentally-mediated spawning induction systems. A major emphasis is to extend the environmental approach to include manipulation of the maturation phase through photoperiod and water temperature adjustment. This could provide the tool needed for year-round fry production. Also, the effects of repeated treatments of gonadotropin hormones on ovulation, spermiation and gamete quality is being assessed.

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Fish culture/Spawning/Hatcheries/Fingerlings/Barramundi fisheries/

TAXONOMIC TERMS: Lates calcarifer

[QDPI—040]

291 Pilot investigation into biology of threadfin salmon (family Polynemidae).

July 1986 - June 1990

ORGANIZATION:
Queensland Department of Primary Industries, Northern Fisheries Research Centre
PO Box 5396
Cairns Mail Centre, Qld 4870

PROJECT LEADER:
Mr R.N. Garrett (070) 515588

EXPENDITURE:
$18,700 (this year), $45,200 (all years)

MANPOWER:
1.00 (this year), 3.00 (all years)

OBJECTIVES

Threadfins include several species which are valuable food-fishes in northern Australia. Large numbers are taken in commercial gillnetting operations throughout the Gulf of Carpentaria and along the east Queensland coast.

Biological data for the Australian threadfin species are lacking. Appropriate management regulations can be implemented only when detailed information is available on the growth, movements, sexuality and age composition of fished stocks.

This project seeks to develop in a pilot study the basic field and laboratory techniques needed to appraise the Queensland threadfin salmon resource. These can then provide direction for the design and implementation of future management-oriented research.

METHODOLOGY

1. Develop suitable techniques for the capture, handling, transport and husbandry of these delicate species for experimental work.
2. Conduct tank experiments and undertake field trials with tagged specimens for movement and growth information.
3. Establish preliminary details on age, growth, reproductive biology, feeding biology, and seasonal abundance for the major species by routinely examining fishermen's catches.

STATUS

Investigations of threadfin salmon have mostly been directed towards the most valuable commercial species, the king salmon *Polynemus sheridani*. Gulf of Carpentaria *P. sheridani* populations appear to be hermaphroditic, and the large female fish demonstrate a marked seasonal abundance in inshore habitats. A preliminary von Bertalanffy growth curve ($k = 0.23$, $L = 1200$ mm, $to = 0.4$) has been derived for Gulf fish from otolith reading. Validation of annual ring formation on otoliths is currently being attempted through marginal increment analysis in the 600-700 mm LCF age class. Significant differences in standard population parameters are apparent between salmon in Gulf and Queensland east coast districts; these suggest the existence of multiple salmon stocks. Biological tissues for discrete stock analysis are being collected for protein gel electrophoretic treatment, and will supplement field-generated distribution information.

GEOGRAPHIC REGIONS: C,R

MAJOR DESCRIPTORS: Fishery biology/Stock assessment/Growth/Life cycle/Migrations/
TAXONOMIC TERMS: Polynemidae; Eleutheronema tetradactylum; Polynemus sheridani

[QDPI—041]

292 Surveys of seagrass prawn nursery grounds in Queensland.

December 1985 - July 1989

ORGANIZATIONS:
Queensland Department of Primary Industries, Northern Fisheries Research Centre
PO Box 5396
Cairns Mail Centre, Qld 4870

Great Barrier Reef Marine Park Authority
PO Box 1379
Townsville, Qld 4810

PROJECT LEADERS:
Dr R.G. Coles (070) 515588
Ms C. Baldwin (077) 818811

CONTACT OFFICER:
Dr R.G. Coles

EXPENDITURE:
$50,000 (this year), $80,000 (all years)

MANPOWER:
3.00 (this year), 10.00 (all years)

EXTERNAL SUPPORT:
FIRTA - $81,648

OBJECTIVE
To survey and describe aspects of the inshore seagrass beds and the juvenile prawn population in Queensland.

METHODOLOGY
The extent and structure of seagrass beds is sampled on transects into the coast. Where seagrasses occur a square metre of the bottom is collected for laboratory analysis. Samples of prawns are collected by trawling at night with small mesh beam trawls.

STATUS
Field data has been collected from the coast between Mornington Island in the Gulf of Carpentaria, and Bundaberg. Writing of reports and papers is in progress.

CO-ORDINATION WITH OTHER PROJECTS
CSIRO are mapping seagrass beds in other parts of the Gulf of Carpentaria

GEOGRAPHIC REGIONS: C,R
MAJOR DESCRIPTORS: Prawn fisheries/Sea grass/Nursery grounds/Juveniles/
TAXONOMIC TERMS: Penaeidae

[QDPI—032]

293* Barramundi breeding - Lake Tinaroo stocking.

ORGANIZATION:
Queensland Department of Primary Industries, Walkamin Research Station
Walkamin, Qld 4872

PROJECT LEADER:
Mr M. MacKinnon (070) 933834

OBJECTIVES
1. To monitor the progress of stocked barramundi in Tinaroo Dam.
2. To collect data on other angling species stocked in Tinaroo Dam.

METHODOLOGY
Some 15000 barramundi fingerlings were stocked into Lake Tinaroo on the Atherton Tablelands in December 1985. Monthly gillnet samples of barramundi have been made at different sites in the storage to obtain data on growth, distribution, gut contents and reproductive status. Samples of scales and otoliths have also been taken to provide validation for ageing techniques. In March 1987, a tagging program on barramundi, sooty grunter, silver perch and sleepy cod commenced to provide information on population size, movements, growth and angling pressure.

STATUS
Rapid growth has occurred through the warmer months with little or no growth during the months June to September. Overall growth rates may support previous suggestions that barramundi grow faster in freshwater than in salt water. Mean weight of fish at 18 months old was 2.5 kg with individuals to 4.7 kg. Scale readings indicate most specimens form a single growth check in spring. There has been an unexpectedly high incidence of primary female fish in those sampled. Feeding appears centred on bony bream and hardy heads.

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Lakes/Stocking (organisms)/Breeding/Barramundi fisheries/Freshwater aquaculture/

TAXONOMIC TERMS: Lates calcarifer

[QDPI—059]

See also:

104 Biological basis for managing populations of dugongs and other marine mammals in the Great Barrier Reef Marine Park.

113* The biology, ecological role, and fishery potential of sharks in the coastal waters of North Queensland.

120 Genetic improvement of the Sydney Rock Oyster.

171 COASTAL PELAGIC RESOURCES: Distribution and dynamics of baitfish.

172 COASTAL PELAGIC RESOURCES: Distribution and dynamics of billfish.

173 COASTAL PELAGIC RESOURCES: Distribution and dynamics of clupeid larvae.

255 Diseases of cultured penaeid prawns.

318 Oyster project.

294 An assessment of the Queensland east coast prawn trawling closure.

November 1984 - July 1988

ORGANIZATION:
Queensland Department of Primary Industries, Northern Fisheries Research Centre
PO Box 5396
Cairns Mail Centre, Qld 4870

PROJECT LEADERS:
Dr R.G. Coles (070) 515588
Mr J. Tilbury (07) 2275428

CONTACT OFFICER:
Dr R.G. Coles

EXPENDITURE:
$19,000 (this year), $48,000 (all years)

MANPOWER:
1.00 (this year), 2.00 (all years)

OBJECTIVES

1. To provide industry and management authorities with an assessment of the effect of cessation of trawling on the number and size of prawns on the fishing grounds.
2. To assess the possibility that emigration and natural mortality will result in a net loss of prawns to the fishery during the closed period, and
3. To examine how appropriate the timing of the closures are in preventing capture of juvenile prawns for each of the species involved.

METHODOLOGY

Samples have been collected using the research vessel the *Gwendoline May* on fishing grounds at Princess Charlotte Bay, Cape Bedford, Cairns and Townsville. Prawns caught are sorted into species, weighed, and carapace length measured.

STATUS

Data from the 1985 and 1985/86 closures are on IBM format floppy disk. Data have been analysed and a report for fishermen prepared. The 1987 closure is currently being assessed.

LOCALITIES: Cairns; Townsville; Cape Bedford; Princess Charlotte Bay

GEOGRAPHIC REGIONS: R,Z

SHIP TIME REQUIREMENTS: 25 days

MAJOR DESCRIPTORS: Prawn fisheries/Trawling/Season regulations/Fishery resources/Fishery management/

[QDPI—030]

295* Development of barramundi (*Lates calcarifer*) (Bloch), prawn (Penaeidae) and mud crab (*Scylla serrata*) (Forskal) hatchery and farming techniques.

June 1986 -

ORGANIZATION:
Sea Hatcheries Ltd
PO Box 4
Mourilyan, Qld 4858

PROJECT LEADERS:
Dr M.P. Heasman (070) 632455
Mr S. Fielder (070) 632455
Mr J. Aspinall (070) 632455

CONTACT OFFICER:
Dr M.P. Heasman

EXTERNAL SUPPORT:
FIRTA (for mud crabs project)

OBJECTIVE

To establish techniques in order to commercially produce multi-species marine products.

METHODOLOGY

1. Barramundi: The main hatchery and nursery complex including water and air systems, live food production area and broodstock holding facilities were completed and operational during 1987. Floating pontoons for laboratory staff facilities and workshops and an extensive cage system for grow-out are in place at the farm site. Procedures and infrastructure for breeding and induction of barramundi and prawn stocks has commenced. Genetic improvement of broodstock is currently being investigated by Jim Aspinall.
2. Mud crabs: Assisted by a FIRTA grant, Stewart Fielder is refining larval rearing techniques and studying moult related cannibalism of juvenile crabs in a controlled environment.

STATUS

All elements for commercial production are now in place (technology, people, systems and stock). The first hatchlings are in place to commence the 1987/88 season. Successful production from the current spawning season will generate harvestable product that will be grown for sale commencing March 1988. Production of post larval prawns has also commenced.

GEOGRAPHIC REGIONS: R,C

SHIP TIME REQUIREMENTS: 4 weeks

MAJOR DESCRIPTORS: Aquaculture/Hatcheries/Fish culture/Crab culture/Prawn culture/Barramundi fisheries/

TAXONOMIC TERMS: Lates calcarifer; Penaeidae; Scylla serrata

[SEAHAT002]

See also:

319 Effects of trawling of Great Barrier Reef inter-reef areas: pilot study.

296 Post-harvest quality of tropical and sub-tropical seafood.

January 1987 -

ORGANIZATION:
Queensland Department of Primary Industries, Food Research Laboratories
19 Hercules Street
Hamilton, Qld 4007

PROJECT LEADERS:
Mrs S. Poole (07) 2682421
Dr H.C. Deeth (07) 2682421

CONTACT OFFICER:
Mrs S. Poole

EXPENDITURE:
$80,000 (this year), $130,000 (all years)

MANPOWER:
3.00 (this year), 6.00 (all years)

EXTERNAL SUPPORT:
NT Department of Primary Industry and Fisheries, Division of Fisheries - $60,000

OBJECTIVE
To determine optimal handling techniques and spoilage characteristics for Australian tropical and sub-tropical seafood species.

METHODOLOGY
Assess the effects of a range of handling techniques on the storage lives of the various species.
Use biochemical, microbiological and sensory methods to monitor spoilage.
Identify the microbiological flora responsible for spoilage of warm water species.

STATUS
In preliminary trials, some species of prawns, saucer scallops *Amusium balloti*, and some tropical fish including reef species have been examined.

GEOGRAPHIC REGIONS: Q,R,C,Y,J

SHIP TIME REQUIREMENTS: 15 days

MAJOR DESCRIPTORS: Seafood/Food technology/Quality control/Processed fishery products/ Fish spoilage/

TAXONOMIC TERMS: Amusium balloti; Lethrinus; Lutjanus; Pristipomoides

[QDPI—057]

297* Passive integrated transponders used in the detection of crown-of-thorns starfish.

September 1986 - June 1988

ORGANIZATIONS:
Deakin University
Victoria, 3217

Australian Institute of Marine Science
Townsville, Qld 4810

PROJECT LEADERS:
Dr R.D. Peden (052) 471233
Dr P. Moran (077) 789211

CONTACT OFFICER:
Dr R.D. Peden

EXPENDITURE:
$3,000 (this year), $3,000 (all years)

MANPOWER:
0.20 (this year), 0.20 (all years)

OBJECTIVES

To develop and reconstruct the P.I.T. (Passive Integrated Transponder) tag system for use in sea water. To specifically adapt the detection system for crown-of-thorns starfish.

METHODOLOGY

Until now the P.I.T. tag system has only been used in air or around fresh water in the piping pathways of fish ladders. Excitation losses in sea water are considerable and new electronics have been developed to generate the necessary magnetic field strength in sea water to drive a large search coil.

STATUS

A high power exciter has been developed and the system proven in the laboratory. The electronics have been encapsulated in an underwater housing.

Completed Project - This project will remain in the computerized Register for another 5 years but will not be included in future issues of the Compendium.

CO-ORDINATION WITH OTHER PROJECTS

Following successful trials the P.I.T. I.D. system will be interfaced with the "Finmap" navigation and mapping system.

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Transponders/Coral reefs/Crown of thorns starfish/Detection/Predator control/

TAXONOMIC TERMS: Acanthaster planci

[DEAKIN005]

298* **Cracking of concrete in coastal and marine environments - a major technological problem.**

January 1986 -

ORGANIZATION:
James Cook University of North Queensland,
Department of Civil and Systems Engineering
Material Science Laboratory
Townsville, Qld 4811

PROJECT LEADER:
Dr N.C. Kothari (077) 814346

EXPENDITURE:
$20,000 (this year), $20,000 (all years)

MANPOWER:
1.50 (this year), 1.50 (all years)

EXTERNAL SUPPORT:
Cement and Concrete Association of Australia

OBJECTIVES

1. To examine concrete structures and damage due to corrosion of reinforcing steel in coastal and marine structures in tropical regions.
2. To determine concrete deterioration with regard to crack width, depth and length.

METHODOLOGY

This research involves a survey of existing concrete structures and their deterioration in major Australian ports and coastal areas.
Laboratory testing involves the use of both normal and accelerated exposure of concrete samples to the marine environment to determine crack formation, rate of crack propagation, degree of corrosion of reinforcement and degree of concrete deterioration.

STATUS

Some preliminary data have been obtained and analysed.

GEOGRAPHIC REGIONS: R,Q,N,A

MAJOR DESCRIPTORS: Concrete structures/Corrosion/Deterioration/Tropical environment/

[JAMESC097]

299* **Development of marine stinger-resistant swimming enclosure.**

January 1984 -

ORGANIZATION:
James Cook University of North Queensland,
Department of Civil and Systems Engineering
Townsville, Qld 4811

PROJECT LEADERS:
Prof K. Stark (077) 814270
Mr K. Moss (077) 814346

CONTACT OFFICER:
Mr K. Moss

EXTERNAL SUPPORT:
AMP Society - $46,000 (Granted for 1988)

OBJECTIVE

Upgrade an existing design of swimming enclosures developed at JCU, to enable more efficient deployment and maintenance; to cater for wider ranges of beach and weather conditions; and provide better protection against a variety of stingers.

METHODOLOGY

A finer mesh to exclude the Irukandji stinger and seasnakes will be incorporated. A more sophisticated mechanical handling system based on a motorised winch will be developed.

STATUS

Existing enclosures developed at JCU have proved the concept over the past five years while in use at up to ten beaches.

GEOGRAPHIC REGIONS: R,J,C,Y

MAJOR DESCRIPTORS: Bathing/Enclosures/Dangerous organisms/Safety devices/

[JAMESC120]

300* **Instrumented rotary drilling and heavy dynamic probing as predictive tools for the construction performance of piles in coralline material.**

July 1986 - July 1989

ORGANIZATIONS:
James Cook University of North Queensland,
Department of Civil and Systems Engineering
Townsville, Qld 4811
CSIRO, Division of Geomechanics
PO Box 54
Mount Waverley, Vic 3149

PROJECT LEADERS:
Assoc Prof H. Bock (077) 814431
Mr J.R. Enever (03) 2351355

CONTACT OFFICER:
Mr S.B. McKean (077) 814470

EXPENDITURE:
$43,000 (this year), $85,000 (all years)

MANPOWER:
1.80 (this year), 2.80 (all years)

EXTERNAL SUPPORT:
MSTGS - $140,000
Barrier Reef Holdings Ltd - $11,800

OBJECTIVE
To develop some guidelines for the prediction of pile construction performance in coralline environments. Instrumented rotary drilling and heavy dynamic probing are being considered, with regard to both their capability and efficiency in delineating the underground structure of coral reefs, in order to establish a suitable site investigation programme.

METHODOLOGY
Instrumented rotary drilling and heavy dynamic probing tests are carried out in the immediate vicinity of existing pile foundations of lighthouses on the Great Barrier Reef. The probing data are analysed and compared with actual pile driving records. Based on these comparisons an attempt is being made to develop some guidelines for the prediction of pile construction performance.
Observations and interpretations made from the field testing are to be substantiated, or otherwise, from the results of laboratory simulated model pile tests. It is also intended that the techniques employed be shown to be capable at depth (ca 60 m) in calcareous material.

STATUS
The results of field tests have shown that there is evident compatibility in terms of specific energy between heavy dynamic probing (HDP), instrumented rotary drilling (IRD) and actual pile driving performance. The specific energy analyses suggest that plugging may be occurring in harder layers at depth. Data is obtained from HDP in the form of a blow count per unit penetration. Relevant drilling parameters are monitored on chart recorders during IRD. Specific energy plots are obtained, comparing the results of field tests and pile driving records, with the aid of computer plotting programmes and some simple theory. Access to the data could be made through the contact officer.

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Coral reefs/Site surveys/Piles/Construction/

[JAMESC119]

301 Norman Reef environmental study.

May 1987 - December 1988

ORGANIZATIONS:

Great Barrier Reef Marine Park Authority
PO Box 1379
Townsville, Qld 4810

Sea Research (Subcontract)
PMB 1
Daintree, Qld 4873

PROJECT LEADERS:

Ms C. Baldwin (077) 818811
Dr A.M. Ayling (070) 986118

CONTACT OFFICER:

Ms C. Baldwin

EXPENDITURE:

$7,100 (all years)

OBJECTIVE

To assess the environmental impact of a tourist operation at Norman Reef, in particular the effects on corals and other encrusting organisms.

METHODOLOGY

Resource mapping in vicinity of pontoon; monitoring of three sites for coral cover and other encrusting organisms, fish populations, clams and crown of thorns starfish at six monthly intervals.

STATUS

Final report received.

Completed Project - This project will remain in the computerized Register for another 5 years but will not be included in future issues of the Compendium.

LOCALITY: Norman Reef

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Coral reefs/Environmental impact/Recreation/Man-induced effects/

[GBRMPA178]

302 Oral history of human use of the Great Barrier Reef, and experience with crown of thorns starfish.

March 1986 - December 1988

ORGANIZATIONS:

Great Barrier Reef Marine Park Authority
PO Box 1379
Townsville Qld 4810

Griffith University, School of Humanities
Nathan, Qld 4111

PROJECT LEADERS:

Dr W. Craik (077) 818811
Dr A. Chase (07) 2757444
Ms R. Ganter (07) 2757760

CONTACT OFFICER:

Ms C. Dalliston (077) 818811

EXPENDITURE:

$10,000 (all years)

OBJECTIVE

To undertake an oral history study to investigate human use of the reef and experience with crown of thorns starfish.

METHODOLOGY

A socio-historian interviewed contacts and established a network of knowledge bearers regarding the extractive industries of the reef. The interviews were complemented by archived manuscripts and correspondence.

STATUS

90 interviews recorded from trochus and pearl divers. These have been summarised and cross referenced. Report available from GBRMPA. This project will be followed up with interviews of old Japanese pearlers.

Completed Project - This project will remain in the computerized Register for another 5 years but will not be included in future issues of the Compendium.

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Coral reefs/Sociological aspects/Historical account/Crown of thorns

starfish/

TAXONOMIC TERMS: Acanthaster planci

[GBRMPA120]

303 Past, present and future changes in the Cairns and Townsville urban coastlines.

February 1985 -

ORGANIZATIONS:

Great Barrier Reef Marine Park Authority
PO Box 1379
Townsville Qld 4810

James Cook University of North Queensland,
Department of Geography (Subcontract)
Post Office
James Cook University, Qld 4811

PROJECT LEADERS:

Dr W. Craik (077) 818811
Ms J. Spriggs (077) 814111

CONTACT OFFICER:

Ms C. Dalliston (077) 818811

EXPENDITURE:

$1,725 (all years)

MANPOWER:

0.50 (this year), 2.50 (all years)

OBJECTIVES

To analyse long-term physical coastal changes along the Cairns and Townsville urban coastlines from the time of first settlement.
To locate sites with most rapid changes and investigate possible causes.
To study current management policies.

METHODOLOGY

Study of maps, photographs and written records including local and state government records, in Brisbane, Cairns and Townsville.

STATUS

Study of Cairns coastline complete. Project has been delayed.

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Long-term changes/Urbanization/Historical account/Coastal zone management/ Coastal morphology/

[GBRMPA156]

304 Reef user survey of crown of thorns starfish *Acanthaster planci*.

January 1982 -

ORGANIZATION:

Great Barrier Reef Marine Park Authority
PO Box 1379
Townsville Qld 4810

PROJECT LEADER:

Dr L. Zann (077) 818811

CONTACT OFFICER:

Dr L. Zann

OBJECTIVES

To monitor the situation with regard to:
(i) the spread of crown of thorns starfish throughout the Great Barrier Reef region,
(ii) the intensity of crown of thorns starfish predation of reefs throughout the Great Barrier Reef region.
To provide an historical database of (i) and (ii) above.

METHODOLOGY

Reef users are provided with crown of thorns sighting forms which they complete for individual reefs visited.

STATUS

Programme continuing. Database records analysed and submitted for publication by AIMS.

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Coral reefs/Predation/Crown of thorns starfish/Population characteristics/Data collections/ Historical account/

TAXONOMIC TERMS: Acanthaster planci

[GBRMPA145]

305 Socio-economic consequences of major populations of crown of thorns starfish.

May 1986 - June 1988

ORGANIZATIONS:
Great Barrier Reef Marine Park Authority
PO Box 1379
Townsville Qld 4810
Griffith University, Institute of Applied Environmental Research (Subcontract)
Nathan, Qld 4111

PROJECT LEADERS:
Ms S. Driml (077) 818811
Dr T. Hundloe (07) 2757444

CONTACT OFFICER:
Ms S. Driml

EXPENDITURE:
$0 (this year), $39,800 (all years)

OBJECTIVES
To ascertain the financial, employment and net economic effects of major populations of crown of thorns starfish on users of the Great Barrier Reef.
To assess users' attitudes to crown of thorns starfish.

METHODOLOGY
Design and development of questionnaires and subsequent analysis and modelling of data resulting from field surveys.

STATUS
Report received and reviewed internally. Publication under consideration.

Completed Project - This project will remain in the computerized Register for another 5 years but will not be included in future issues of the Compendium.

GEOGRAPHIC REGION: R
MAJOR DESCRIPTORS: Coral reefs/Crown of thorns starfish/Sociological aspects/Economics/
TAXONOMIC TERMS: Acanthaster planci

[GBRMPA122]

306 Great Barrier Reef Resource Inventory - Cairns section update.

January 1988 -

ORGANIZATIONS:

Great Barrier Reef Marine Park Authority
PO Box 1379
Townsville, Qld 4810

Australian Littoral Society (Subcontract)
PO Box 49
Moorooka, Qld 4105

PROJECT LEADERS:

Mr S. Hillman (077) 818864
Mr E. Hegerl (07) 8485235

CONTACT OFFICER:

Mr S. Hillman

EXPENDITURE:

$15,145 (all years)

OBJECTIVE

To assemble attributive information regarding reefs and islands of the Great Barrier Reef Marine Park. Included will be tenure, land use, reef type and history, as well as the value of the location for diving, fishing, fossicking etc.

METHODOLOGY

Literature searches and examination of records held by Great Barrier Reef Marine Park Authority, Queensland National Parks and Wildlife Service, Lands Department etc. Data to be transferred to Great Barrier Reef Marine Park Authority for storage in a database.

LOCALITY: Cairns

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Coral reefs/Marine parks/Recreation/Resource surveys/Inventories/

[GBRMPA169]

307 Monitoring health of Cairns Reefs - manta tow.

April 1988 - December 1988

ORGANIZATIONS:

Great Barrier Reef Marine Park Authority
PO Box 1379
Townsville, Qld 4810

Sea Research
Box 5645
Townsville MC, Qld 4810

PROJECT LEADERS:

Mr S. Hillman (077) 818811
Dr A.M. Ayling (077) 725300
Dr A.L. Ayling

CONTACT OFFICER:

Mr S. Hillman

EXPENDITURE:

$8,762 (this year), $16,762 (all years)

OBJECTIVE

To survey, using the GBRMPA manta-tow method, reefs in the Cairns Section of the Great Barrier Reef Marine Park to assist with the 5-year review of zoning of the Section.

METHODOLOGY

The method used will be the 'GBRMPA' method as described by Dr T. Done in his report to the GBRMPA in March 1980. Each reef will be surveyed for: aesthetics, hard and soft coral covers, dead coral, macroscopic algae, colony size and diversity. Visually dominant organisms (VDO's) will also be recorded.

STATUS

Project completed. Reef descriptions provided for the review of the Cairns zone of the Great Barrier Reef Marine Parks.

Completed Project - This project will remain in the computerized Register for another 5 years but will not be included in future issues of the Compendium.

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Coral reefs/Marine parks/Biological surveys/Community composition/Biota/

[GBRMPA186]

308 Hydrocarbons in sediments and seawater.

March 1987 - December 1988

ORGANIZATION:

CSIRO, Division of Oceanography
Marine Laboratories
GPO Box 1538
Hobart, Tas 7001

CONTACT OFFICER:

Dr J.K. Volkman Telephone: (002) 20 6222
Telex: 57182 Fax: (002) 24 0530

OBJECTIVE

The coastal zone is particularly vulnerable to the impact of man's activities. In this project, hydrocarbons in marine environments from Antarctica to the Great Barrier Reef are being studied to assess the contributions from the biota, pollution, and natural oil seeps in a range of polluted and non-polluted sediments. Gas chromatography-mass spectrometry is used to fingerprint the complex distributions that are present.

METHODOLOGY

The coastal zone is particularly vulnerable to the impact of man's activities so it is essential to have good data on baseline concentrations of chemical elements and compounds together with an understanding of how organisms in these environments respond to pollution. In this project hydrocarbons in marine environments from Antarctica to the Great Barrier Reef are being studied to provide baseline data for unpolluted environments. Gas chromatography-mass spectrometry is used to distinguish between biologically-produced hydrocarbons and those from petroleum.
The importance of oil seeps as a source of hydrocarbons is also being investigated and methods are being developed to distinguish between petroleum hydrocarbons from pollution and those from oil seeps. Such information could be useful to petroleum exploration companies in their search for new petroleum reserves.
The importance of bacteria as a source of hydrocarbons and as agents for the degradation of these compounds is being assessed.

GEOGRAPHIC REGIONS: V,R

MAJOR DESCRIPTORS: Hydrocarbons/Sea water/Sediment analysis/Chemical analysis/Man-induced effects/Baseline studies/

[CM-30DC14]

309 A pilot study of baseline levels of nutrients around Green Island.

May 1989 -

ORGANIZATIONS:

Great Barrier Reef Marine Park Authority
PO Box 1379
Townsville, Qld 4810

James Cook University of North Queensland
Post Office
James Cook University, Qld 4811

Australian Centre for Tropical Freshwater Research

PROJECT LEADERS:

Ms C. Baldwin (077) 818811
Mr J. Brodie (077) 814111

CONTACT OFFICER:

Ms C. Baldwin

EXPENDITURE:

$3,780 (this year), $7,560 (all years)

OBJECTIVES

1. To establish the spatial extent of nutrient enrichment resulting from direct or indirect waste discharge.
2. To provide baseline data on nutrient levels suspended sediments, and other parameters so that comparisons can be made in the future.
3. To provide information so that nutrient concentrations can be related to biotic response, in particular benthic cover and seagrass distribution.

LOCALITY: Green Island

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Wastes/Water pollution/Nutrients (mineral)/Baseline studies/Biota/

[GBRMPA194]

310 Crown of thorns starfish control - biological and economic risk analysis study.

May 1986 - June 1988

ORGANIZATIONS:

Great Barrier Reef Marine Park Authority
PO Box 1379
Townsville Qld 4810

Griffith University, Institute of Applied Environmental Research (Subcontract)
Nathan, Qld 4111

PROJECT LEADERS:

Ms S. Driml (077) 818811
Dr T. Hundloe (07) 2757444

CONTACT OFFICER:

Ms S. Driml

EXPENDITURE:

$0 (this year), $33,000 (all years)

OBJECTIVE

To undertake a risk analysis to contribute to the assessment of the need for control of crown of thorns starfish.

METHODOLOGY

Consultation and literature review followed by development of ecological and economic models.

STATUS

Data gathered on cost of clearance, modelling of ecological data completed, and discussions held at ANZAAS 1987. Draft report submitted to GBRMPA. Under review..

Completed Project - This project will remain in the computerized Register for another 5 years but will not be included in future issues of the Compendium.

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Coral/Predator control/Risks/Models/Crown of thorns starfish/

TAXONOMIC TERMS: Acanthaster planci

[GBRMPA121]

311 Oil slicks: park management and information requirements.

October 1988 -

ORGANIZATIONS:

Great Barrier Reef Marine Park Authority
PO Box 1379
Townsville, Qld 4810

Marine Bio Logic
PO Box 959
Townsville, Qld 4810

PROJECT LEADERS:

Dr W. Craik (077) 818811
Mr B. Kettle (077) 211676

CONTACT OFFICER:

Dr W. Craik

EXPENDITURE:

$1,500 (this year)

OBJECTIVES

To undertake studies relevant to planning/park management/education information requirements.
To provide a pamphlet for the general public which will describe and differentiate coral spawning, algal blooms and oil slicks.

STATUS

A draft text for the pamphlet has been researched and produced. Delay in obtaining good quality photographs of algal bloom.

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Oil slicks/Marine parks/Environment management/Education/

[GBRMPA195]

312 Oil spill strategic atlas - assessment of an appropriate system.

March 1989 -

ORGANIZATIONS:

Great Barrier Reef Marine Park Authority
PO Box 1379
Townsville, Qld 4810

Marine Bio Logic
PO Box 959
Townsville, Qld 4810

PROJECT LEADERS:

Mr S. Hillman (077) 818811
Mr B. Kettle (077) 211676

CONTACT OFFICER:

Mr S. Hillman

EXPENDITURE:

$4,800 (this year), $4,800 (all years)

OBJECTIVE

A study of requirements of an oil spill strategic atlas, including software/hardware, to facilitate same, and interfaces to GIS software.

STATUS

The preliminary atlas was used in a desk-top oil spill exercise held in June 1989 by Department of Transport and Communications, Great Barrier Reef Marine Park Authority and the Department of Harbours and Marine.

CO-ORDINATION WITH OTHER PROJECTS

The atlas is being developed further by State and National Committees.

GEOGRAPHIC REGION: X

MAJOR DESCRIPTORS: Oil spills/Oil pollution/Pollution control/Computer programs/Atlases/

[GBRMPA191]

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313 Reef fish and the impact of tourist pontoon activities.

March 1989 -

ORGANIZATIONS:

Great Barrier Reef Marine Park Authority
PO Box 1379
Townsville, Qld 4810

Reef Biosearch Pty Ltd
PO Box 217
Port Douglas, Qld 4871

PROJECT LEADERS:

Mr S. Hillman (077) 818811
Ms W.G. Richards (070) 993261

CONTACT OFFICER:

Mr S. Hillman

EXPENDITURE:

$10,000 (this year), $15,000 (all years)

OBJECTIVES

1. To collate and summarize the existing information for the Agincourt Reef system.
2. To recommend on the basis of the above information, important subject areas to monitor in the future for the effects of human impact.
3. To examine temporal and spatial trends in the abundances of selected fish species (as observed previously) with specific relation to:
(a) the effect of the pontoon and associated human activity on species composition and abundance compared with control sites; and
(b) the significance of short-term influences, particularly the state of the tide and time of day, on variations in abundances of reef fish.

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Reef fish/Barrier reefs/Man-induced effects/Environmental impact/Pontoons/Recreation/

[GBRMPA198]

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314 Survey of shell collecting on the Great Barrier Reef.

March 1986 - February 1989

ORGANIZATIONS:

Great Barrier Reef Marine Park Authority
PO Box 1379
Townsville Qld 4810

Barnett, Ms B. (Subcontract)

PROJECT LEADERS:

Dr L. Zann (077) 818811
Ms B. Barnett (077) 818811

CONTACT OFFICER:

Dr L. Zann

EXPENDITURE:

$3,000 (this year), $29,000 (all years)

OBJECTIVES

To establish a profile of the specimen shell industry on the Great Barrier Reef.
To identify major target species and collection localities and to identify those species/localities susceptible to over collection.
To develop appropriate guidelines for management and to identify future monitoring needs.

METHODOLOGY

Review internal studies and scientific literature. Develop and disseminate questionnaire and analyse subsequent results. Prepare management recommendations.

STATUS

A review of the literature and internal reports has been completed. The principal collector groups have been identified, personal contact established with shell club groups between Cairns and Brisbane, and a questionnaire developed and circulated. Field work has included shell collecting trips with members of Cairns and Townsville Shell clubs and visits to popular shelling sites. Report proposing management options for shell collecting in the Great Barrier Reef Marine Park has been submitted.

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Shells/Sociological aspects/Check lists/Resource management/Baseline studies/

[GBRMPA138]

315 Water quality between Barron River/Trinity Inlet and Green Island and the effect of seasonal change.

April 1988 -

ORGANIZATIONS:

Great Barrier Reef Marine Park Authority
PO Box 1379
Townsville, Qld 4810

James Cook University of North Queensland
Post Office
James Cook University, Qld 4811

PROJECT LEADERS:

Ms C. Baldwin (077) 818811
Dr T. Thomas (077) 814111
Assoc Prof D. Yellowlees

CONTACT OFFICER:

Ms C. Baldwin

EXPENDITURE:

$5,925 (this year), $12,925 (all years)

OBJECTIVE

To determine the influence of Barron River discharge on the water quality (particularly nutrients) between the Barron estuary and Green Island during both wet and dry seasons.

STATUS

Study continuing - request for further funding in 1989-90.

CO-ORDINATION WITH OTHER PROJECTS

This project is co-ordinated with other studies on mainland runoff and nutrients in nearshore reef areas.

LOCALITIES: Green Island; Barron River

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Water quality/Eutrophication/Nutrients (mineral)/Seasonal variations/River discharge/

[GBRMPA193]

316* Effect of disturbed rainforest catchments on adjacent fringing reefs, Cape Tribulation area, North Queensland.

September 1985 - December 1989

ORGANIZATION:

James Cook University of North Queensland,
Sir George Fisher Centre for Tropical Marine Studies
Townsville, Qld 4811

PROJECT LEADERS:

A/Prof D. Hopley (077) 814817
Ms C. Baldwin (077) 818811

CONTACT OFFICER:

A/Prof D. Hopley

EXPENDITURE:

$28,575 (this year), $38,461 (all years)

MANPOWER:

2.00 (this year), 3.50 (all years)

EXTERNAL SUPPORT:

GBRMPA - $38,461

OBJECTIVE

To measure the amount of sediment being generated by the disturbance of natural rainforest catchments by road development in the Cape Tribulation area and to follow the sediment pathways from catchments to adjacent reefs and nearshore waters. The Holocene history of the reefs is also being studied to determine pre-European terrigenous input.

METHODOLOGY

A literature search on sedimentation/runoff problems on fringing reefs. Aerial photographic analysis of changes to the coast over the period 1940-1985. Rainfall, stream level and sediment yield in the catchment area above and below road development. Sediment trap placement on adjacent fringing reefs. Geological record contained in the Cape Tribulation Reefs studied with a drilling program and subsequent laboratory analysis. Nearshore circulation using fluorescent dyes.

STATUS

Nine holes drilled to basement in three reefs. Sediment trap work completed and report submitted. Basic geomorphological mapping of reefs completed aided by colour and colour infra-red aerial photography.

LOCALITY: Cape Tribulation

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Fringing reefs/Geological history/Runoff/Ecosystem disturbance/Catchment area/Sediment transport/

[JAMESC091]

317* **Effect on reef growth of mainland run-off from agricultural catchments, Cairns area, Great Barrier Reef.**

January 1987 - June 1990

ORGANIZATIONS:

James Cook University of North Queensland, Sir George Fisher Centre for Tropical Marine Studies
Townsville, Qld 4811

University of Melbourne, Department of Organic Chemistry
Parkville, Vic 3052

PROJECT LEADERS:

A/Prof D. Hopley (077) 814817
Prof R.B. Johns (03) 3444000

CONTACT OFFICER:

Mrs C. Rasmussen (077) 814519

EXPENDITURE:

$28,500 (this year), $60,000 (all years)

MANPOWER:

1.20 (this year)

EXTERNAL SUPPORT:

GBRMPA - $28,500

OBJECTIVE

To determine the effects of agricultural development on the quality of mainland run-off in the Cairns area and trace the run-off through river plumes to the Great Barrier Reef. Evaluation of the effects on coral skeletal deposition both temporally (via coral coring) and spatially and examine the possibilities of relationships with *Acanthaster planci* infestations.

METHODOLOGY

Water analysis/sediment analysis from the Barron River and adjacent basins, and cross shelf sampling of coastal waters on a seasonal basis, particularly for phosphate and nitrate. Coring of living corals and subsequent geochemical analysis (especially strontium) to indicate the influence of enhanced phosphate levels. At least 200 years of records should be available in the corals. Correlation with known outbreaks of *Acanthaster planci* (derived from the research programs).

STATUS

Analysis of a pilot study on Low Isles in 1986 indicated a reduction in strontium levels in corals apparently related to enhanced phosphate content of inshore waters. Access through contact officer.

CO-ORDINATION WITH OTHER PROJECTS

Related to Crown-of-thorns Advisory Review Committee research (AIMS/GBRMPA)

LOCALITIES: Barron River; Cairns

GEOGRAPHIC REGION: R

SHIP TIME REQUIREMENTS: 12 days

MAJOR DESCRIPTORS: Coral reefs/Reef formation/Agricultural runoff/Nutrients (mineral)/

TAXONOMIC TERMS: Acanthaster planci

[JAMESC087]

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318 **Oyster project.**

March 1988 - June 1989

ORGANIZATIONS:

Queensland Department of Primary Industries, Fisheries Management Branch
GPO Box 46
Brisbane, Qld 4001

Queensland Department of Environment, Conservation and Lands

PROJECT LEADERS:

Dr J. Beumer (07) 2246892
Ms E. Whitney (07) 2244346

CONTACT OFFICER:

Dr J. Beumer

OBJECTIVES

1. Establish the extent of tributyltin (TBT) levels in Queensland waterways and assess potential threat to Queensland pearling and oystering from these levels.
2. Investigate effect of TBT water contamination on the growth of Queensland commercial oysters.
3. Publish "Oyster Growing" manual.
4. Update Situation Report and Economics Report on Oyster Industry.

STATUS

Pilot tests of slipyard completed. Oyster farmer survey form completed and forwarded with 80% return rate. Oyster manual being printed for distribution to oystermen.

GEOGRAPHIC REGIONS: Q,R,C

MAJOR DESCRIPTORS: Oyster fisheries/Water pollution/Pollution effects/Pesticides/Fishery economics/

[QDPI—072]

319 Effects of trawling of Great Barrier Reef inter-reef areas: pilot study.

July 1988 - March 1989

ORGANIZATION:

Queensland Department of Primary Industries, Fisheries Research Branch
Southern Fisheries Research Centre
PO Box 76
Deception Bay, Qld 4508

PROJECT LEADER:

Dr I.W. Brown (07) 2031444

EXPENDITURE:

$30,000 (this year), $30,000 (all years)

MANPOWER:

0.60 (this year), 0.60 (all years)

OBJECTIVE

To develop methods and identify sites appropriate for experimental research designed to test effects of prawn trawl operation in inter-reef areas of the the Great Barrier Reef.

STATUS

Three exploratory cruises have been completed (in the Capricorn Group) testing several fish-population sampling methods and assessment equipment.

LOCALITY: Capricorn Group

GEOGRAPHIC REGION: R

SHIP TIME REQUIREMENTS: 30 days

MAJOR DESCRIPTORS: Prawn fisheries/Trawling/Barrier reefs/Stock assessment/Population structure/

[QDPI—061]

320 Effects of dredging and ocean spoil disposal on marine biota.

September 1985 - December 1988

ORGANIZATION:

State Pollution Control Commission (NSW)
Marine Biology Unit
GPO Box 4036
Sydney, NSW 2001

PROJECT LEADER:

Mr P.J. Anink (02) 2658045

EXPENDITURE:

$15,775 (this year), $56,000 (all years)

MANPOWER:

1.50 (this year), 5.00 (all years)

EXTERNAL SUPPORT:

Maritime Services Board of New South Wales - $48,922

OBJECTIVES

1. To monitor the effects of dredge spoil dumping on macrobenthic faunal community structure on the sub-tidal slopes of islands close to the dumping sites, and to monitor any ensuing recovery after dumping has ceased.
2. To ascertain whether the dredge spoil dumping can affect the structure of rocky reef fish communities within the Five Island group.
3. Minor objectives are to ascertain the effects of in-harbour dredging on macrobenthic faunal communities within the the harbour and to look for bio-accumulation of heavy metals released from contaminated dredge spoil into the water column.

METHODOLOGY

Macrobenthos.
Four study sites adjacent to the dump site and two control sites were surveyed immediately before dumping commenced and then at six week intervals SCUBA divers lay a 30 m transect in 22 m depth at the base of the island slope. Sixteen random colour transparencies of area 800 x 600 mm are taken at each survey using a quadrat frame supporting a camera and lighting.
Fish
Visual surveys of reef fish are made from 60 m x 2 m transects. Cryptic species are surveyed at fixed observer speeds, active visual species are surveyed on an instantaneous basis.

STATUS

All field surveys have been completed. Identification of species and analysis of macrobenthic community structure completed. Report presentation is underway.

Completed Project - This project will remain in the computerized Register for another 5 years but will not be included in future issues of the Compendium.

LOCALITIES: Port Kembla; Five Islands Group
GEOGRAPHIC REGIONS: N,R
SHIP TIME REQUIREMENTS: 18 days
MAJOR DESCRIPTORS: Dredging/Ocean dumping/Environmental impact/Benthic environment/Biological surveys/Reef fish/

[NSWPCC004]

321 Marine pollution and the *Acanthaster planci* infestations of the Great Barrier Reef.

- July 1990

ORGANIZATION:
World Life Research Institute, Australian Division
PO Box 126
Newport Beach, NSW 2106

PROJECT LEADERS:
Dr R. Hanna (02) 9183258; N.Q. Office (079) 475733
Mr T.W. Brown (02) 9183258

CONTACT OFFICER:
Mr T.W. Brown

OBJECTIVES

To study the direct and indirect effects of a wide range of pollutants entering the waters of the GBR.
To examine the possible relationship between marine pollution and the *A. planci* (crown of thorns starfish) infestations.

METHODOLOGY

A series of reef site inspections along the northern, central and southern regions of the GBR, involving *A. planci* infested or damaged reefs together with undamaged (control) reefs. Sampling of sea water, sediments and biological materials at seasonal intervals for laboratory analysis.

STATUS

The initial survey and sampling is to commence in June 1987, and extend over a 12 month period to encompass seasonal variations.

GEOGRAPHIC REGION: R
SHIP TIME REQUIREMENTS: Seaplanes: ca. 20 days, 1987; ca. 15 days, 1989; ca. 5 days to July 1990.
MAJOR DESCRIPTORS: Coral reefs/Pollutants/Pollution effects/Predation/Crown of thorns starfish/
TAXONOMIC TERMS: Acanthaster planci

[WORLRI001]

322 **Silt pollution: further observations along Magnetic Island's coral fringing reefs.**

- December 1989

ORGANIZATION:
World Life Research Institute, Australian Division
PO Box 126
Newport Beach, NSW 2106

PROJECT LEADERS:
Dr R. Hanna (02) 9183258; N.Q. Office (079) 475733
Mr T.W. Brown (02) 9183258

CONTACT OFFICER:
Mr T.W. Brown

OBJECTIVE

To further evaluate the long term effects of silt pollution along Magnetic Island's coral fringing reefs.

METHODOLOGY

A series of reef site inspections around Magnetic Island. Sampling of sediments and biological materials for laboratory analysis.

STATUS

The reef surveys and sampling are to commence in June 1987, and extend over a 12 month period. The initial project commenced in 1969 and continued until 1974.

LOCALITY: Magnetic Island

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Fringing reefs/Silt/Pollution effects/

[WORLRI002]

See also:

56 Anthropogenic inputs to the inner reef off Cairns and Green Island.
58 Multielement analysis of marine sediments and tissues of marine organisms.
231 A multi-disciplinary pilot study of Hayman Island.
234 Coral recruitment on fringing reefs near Cape Tribulation.
237 Monitoring of Cape Tribulation fringing reefs.
238* Potential human causes of *Acanthaster planci* aggregations in the South Pacific.
241 Trial control of crown of thorns starfish on the Great Barrier Reef.
297* Passive integrated transponders used in the detection of crown-of-thorns starfish.
327 Monitoring of heavy metals around the Hook Island Observatory.
329* Surveillance of reefs affected by *Acanthaster planci* outbreaks by aerial survey.

323 A survey of public awareness levels: Mackay/Capricorn Section, Great Barrier Reef Marine Park.

August 1988 - June 1989

ORGANIZATIONS:

Great Barrier Reef Marine Park Authority
PO Box 1379
Townsville, Qld 4810

University of Queensland, Survey Research and Consultancy Unit
Department of Anthropology and Sociology
St Lucia, Qld 4067

PROJECT LEADERS:

Mr M. Simmons (077) 818811
Prof J.S. Western (07) 3771111

CONTACT OFFICER:

Mr M. Simmons

EXPENDITURE:

$10,000 (this year), $10,000 (all years)

EXTERNAL SUPPORT:

Queensland Department of Environment and Conservation - $3,966

OBJECTIVES

1. To investigate current levels of awareness of the Great Barrier Reef Marine Park - Mackay/Capricorn Zoning Plan in Mackay and Gladstone; and to investigate current user activities in the Park.
2. To determine the effect of the Public Awareness Program as developed and presented by the Great Barrier Reef Marine Park Authority on the above.

STATUS

Final report on study completed.

Completed Project - This project will remain in the computerized Register for another 5 years but will not be included in future issues of the Compendium.

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Marine parks/Sociological aspects/Environment management/Recreation/

[GBRMPA196]

324 Methods for the re-establishment of hard corals in denuded reef systems.

August 1983 - December 1988

ORGANIZATIONS:

Great Barrier Reef Marine Park Authority
P.O. Box 1379,
Townsville, Qld 4810

James Cook University of North Queensland, Sir George Fisher Centre for Tropical Marine Studies
PO James Cook University, Qld 4811

PROJECT LEADERS:

Dr W. Craik (077) 818811
Dr V. Harriott (077) 818811

CONTACT OFFICER:

Dr L. Zann (077) 818811

EXPENDITURE:

$78,483 (all years)

MANPOWER:

3.50 (all years)

OBJECTIVE

To compile, from available knowledge, a set of procedures for the re-establishment of hard corals on an area of reef where corals once flourished. To test these procedures and evaluate their effectiveness. To prepare a practical handbook.

METHODOLOGY

In phase 1 a draft report which outlines suggested methods for coral community re-establishment, will be prepared after consultation with appropriate scientists and others e.g. tourist/resort operators, Marine Park field staff. A field trip will be undertaken to select suitable study sites to field test the methods proposed in the report (Phase 2). Revision of these methods for handbook.

STATUS

All research completed. Draft final report and handbook submitted. In press.

Completed Project - This project will remain in the computerized Register for another 5 years but will not be included in future issues of the Compendium.

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Coral reefs/Reef formation/Reclamation/

[GBRMPA101]

325 **Research and its role in assisting management of the Great Barrier Reef Marine Park.**

May 1987 -

ORGANIZATIONS:

Great Barrier Reef Marine Park Authority
PO Box 1379
Townsville, Qld 4810

Watson, Ms M. (Subcontract)
14 Berrigan Avenue
Murray Townsville Qld 4814

PROJECT LEADERS:

Dr W. Craik (077) 818811
Ms M. Watson (077) 757176

CONTACT OFFICER:

Dr W. Craik

EXPENDITURE:

$7,728 (all years)

MANPOWER:

0.50 (all years)

OBJECTIVES

1. To document the nature of research at GBRMPA as it has evolved since its establishment as an agency.
2. To depict the overall trends and directions of research at the Authority.
3. To enhance GBRMPA's future capability to analyse trends in the research it has supported.
4. To measure the applicability of research output to the management context.
5. To analyse and summarize those findings in a report for use by the Authority.

METHODOLOGY

1. Document characteristics of research projects funded by GBRMPA between 1976/77 and 1985/86, using GBRMPA Annual Reports, project summaries, registry files, and interviews with staff.
2. Analyse findings according to origin of research initiative, mean levels of funding, organisation doing the research, nature of contract, average project cost, categories of research disciplines, numbers of active projects, geographical area, and funding growth rates. Analysis will entail development of ORACLE database.
3. Compare research funded with the nature of research information used by GBRMPA managers in zoning and permits process. Pilot study to involve GBRMPA files and staff interviews.

STATUS

Project completed. Report to GBRMPA finalised. Paper being prepared for publication. Research projects entered on database.

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Marine parks/Research programmes/Environment management/Financing/

[GBRMPA166]

See also:

32 Review of physical oceanographic models, their representation of the physical oceanography and their application to the management of the Great Barrier Reef.

85 Coastal processes forming and maintaining the coral cays of the Great Barrier Reef and their implications for marine park management.

270 Attitudes of tourists to North Queensland with emphasis on the Great Barrier Reef.

311 Oil slicks: park management and information requirements.

328 Tourist activities on Norman Reef.

326 Investigation of sampling biases in manta tow surveys with particular application to crown of thorns starfish *Acanthaster planci*.

January 1988 -

ORGANIZATIONS:

Great Barrier Reef Marine Park Authority
PO Box 1379
Townsville, Qld 4810

James Cook University of North Queensland
(Subcontract)
Post Office
James Cook University, Qld 4811

PROJECT LEADERS:

Mr S. Hillman (077) 818864
Dr H.D. Marsh (077) 814325

CONTACT OFFICER:

Mr S. Hillman

EXPENDITURE:

$2,000 (this year), $16,314 (all years)

OBJECTIVE

To obtain accurate estimates of the biases associated with the manta tow method of reef surveillance. Biases investigated will be: intra observer, inter observer, visibility, substrate complexity, density of starfish and distribution patterns.

METHODOLOGY

A series of experiments will be carried out as a pilot to assess appropriate methods for this analysis. These initial experiments will be analysed by analysis of variance and covariance, and the results will determine the experimental design.

CO-ORDINATION WITH OTHER PROJECTS

The project will be considered as a part of the overall crown of thorns starfish research programme.

GEOGRAPHIC REGION: R

SHIP TIME REQUIREMENTS: Approximately 30 days for total project - will be as part of other reef surveys.

MAJOR DESCRIPTORS: Crown of thorns starfish/Biological sampling/Monitoring systems/Analytical errors/

TAXONOMIC TERMS: Acanthaster planci

[GBRMPA170]

327 Monitoring of heavy metals around the Hook Island Observatory.

November 1987 - June 1988

ORGANIZATIONS:

Great Barrier Reef Marine Park Authority
PO Box 1379
Townsville, Qld 4810

Marine Bio Logic (Subcontract)
PO Box 959
Townsville, Qld 4810

Ansett Transport Industries, Marine
Operations
PMB 21
Mackay, Qld 4740

PROJECT LEADERS:

Mr S. Hillman (077) 818864
Mr R. Stump (077) 211676
Mr F. Collins (079) 469403

CONTACT OFFICER:

Mr S. Hillman

EXPENDITURE:

$525 (all years)

MANPOWER:

0.10 (all years)

OBJECTIVE

To assess the levels of heavy metals around the Hook Island underwater observatory. The observatory is constructed of steel and glass and has a large zinc anode attached to it.

METHODOLOGY

Oysters will be gathered from 14 sites at varying distances from the anode. These shellfish will be analysed for zinc, cadmium, nickel, lead and copper concentrations.

STATUS

Complete. Paper to be published.

Completed Project - This project will remain in the computerized Register for another 5 years but will not be included in future issues of the Compendium.

LOCALITY: Hook Island

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Anodes/Heavy metals/Pollution monitoring/Molluscs/

[GBRMPA176]

328 Tourist activities on Norman Reef.

May 1987 -

ORGANIZATIONS:

Great Barrier Reef Marine Park Authority
PO Box 1379
Townsville, Qld 4810

James Cook University of North Queensland,
Department of Behavioural Science
PO James Cook University, Qld 4811

PROJECT LEADERS:

Ms C. Baldwin (077) 818811
Dr P. Pearce (077) 814251

CONTACT OFFICER:

Ms C. Baldwin

EXPENDITURE:

$1,450 (this year), $9,500 (all years)

OBJECTIVES

To assess existing visitor amenity to the reef.
To study the effect of an increase in visitor numbers and associated hardware on the amenity.

METHODOLOGY

Questionnaire surveys of visitors on small dive operations visiting Norman Reef.
Questionnaire surveys using a selection of photographs for off-site evaluation.

STATUS

Final report received by the Authority.

LOCALITY: Norman Reef

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Coral reefs/Recreation/Sociological aspects/Man-induced effects/Environmental impact/

[GBRMPA172]

329* Surveillance of reefs affected by *Acanthaster planci* outbreaks by aerial survey.

ORGANIZATIONS:

James Cook University of North Queensland,
Sir George Fisher Centre for Tropical Marine Studies
Townsville, Qld 4811

James Cook University of North Queensland,
Department of Geography

PROJECT LEADERS:

Assoc Prof D. Hopley (077) 814817
Ms P. Catt

CONTACT OFFICER:

Ms P. Catt (077) 814491 (Geography)

EXPENDITURE:

$14,750 (this year), $13,000 (all years)

MANPOWER:

0.20 (this year), 0.30 (all years)

EXTERNAL SUPPORT:

COTSAC - $8,500

OBJECTIVE

To record the damage and subsequent recovery of reef flat corals damaged by crown-of-thorns starfish outbreaks on selected reefs off Townsville using aerial near-infra-red surveys.

METHODOLOGY

Sequential aerial photography of selected reefs from heights ranging from 500 to 7000 feet using near-infra-red (Kodak Aerochrome 2443) and true colour (Kodak 2448) film. Subsequent scanning of selected images and analysis using Micro-BRIAN.

STATUS

Photography of reefs commenced in 1986 with regular coverage (up to four times per year) of Pandora, Orpheus Island, John Brewer, Helix Grub and Wheller Reefs taken on lowest spring tides. Processing of imagery has commenced.

LOCALITIES: Pandora Reef; Orpheus Island; John Brewer Reef; Helix Reef; Grub Reef; Wheeler Reef

GEOGRAPHIC REGION: R

SHIP TIME REQUIREMENTS: 3 days

MAJOR DESCRIPTORS: Crown of thorns starfish/Coral reefs/Predation/Aerial surveys/
TAXONOMIC TERMS: Acanthaster planci

[JAMESC122]

See:

79 Geological investigations for coastal zone management.

288 Stream and estuarine inventory and classification in relation to fish populations.

330* Shipping risk simulation study.

March 1981 -

ORGANIZATION:
James Cook University of North Queensland,
Department of Civil and Systems Engineering
Townsville, Qld 4811

PROJECT LEADER:
Dr M.K. James (077) 814224

EXPENDITURE:
$25,400 (this year), $71,000 (all years)

MANPOWER:
1.20 (this year), 3.60 (all years)

EXTERNAL SUPPORT:
Det Norske Veritas - $7,000
GBRMPA - $7,000
MSTGS - $50,000

OBJECTIVE
To develop a generalized approach to risk assessment in relation to shipping accidents. Application to specific regions will result in risk-zone maps showing the manner in which risks from shipping accidents are distributed in the region.

METHODOLOGY
Problems addressed by this project involve estimating the probabilities of occurrence of very rare events for which no historical statistical base exists. A probabilistic computer-based model is under development, to enable realistic simulation of shipping traffic, environmental conditions, navigation aids, ship manoeuvrability, collision avoidance, and degree of severity of accidents.

STATUS
An extensive survey of the literature of risk analysis and marine navigation has enabled a review of approaches so far developed for the assessment of low probability risks. A computer based model has been developed which simulates the navigation of vessels between Cape Flattery and Princess Charlotte Bay. The logical structure and data requirements of the model have been further refined through discussions with pilots experienced in this region. A novel approach to the modelling of navigation decision-making, based on fuzzy logic, is also under development and is being tested in collaboration with the Australian Maritime College. Programs have been developed to enable the progress of the simulation to be presented graphically in real time. Significant data on shipping incidents in European, North American and Australian waters have been acquired. These data provide the basis for a fault-free analysis of potential accident situations, now underway.

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Shipping/Risks/Accidents/Mathematical models/

[JAMESC003]

Australian Institute of Marine Science