AUSTRALIAN MARINE RESEARCH IN PROGRESS:

GREAT BARRIER REEF REGION 1984-85

Great Barrier Reef Marine Park Authority
Research Publication

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AUSTRALIAN MARINE RESEARCH IN PROGRESS - GREAT BARRIER REEF REGION

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1985

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

Contents

INTRODUCTION

The Great Barrier Reef Marine Park Authority, with the assistance of the CSIRO Central Information Library and Editorial Section, 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 data base designed to assist in co-ordinating 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 co-operation and co-ordination between researchers and the users of research in industry and Government. The further development of the data base should assist researchers to design projects which complement on-going research and to identify areas of research which are not being addressed.

It is proposed that the data base will be updated annually and a hard copy directory will be produced biennially. A special hard copy edition for the Great Barrier Reef Region only will be published in alternate years.

Management of the AMRIP data base is currently co-ordinated by the Australian Institute of Marine Science with the co-operation 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 organization carrying out the research.

Within each subject class, the project summaries are arranged in alphabetical order of main responsible organization 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 most self-explanatory, the user should be aware of the following points:

- *summaries which have been highlighed by an asterisk following the entry number, are identical to those of the previous edition, i.e. no response from the responsible organization was received concerning those projects
- *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/organization

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.

- *The "Subject Index" is the key index in AMRIP. Each entry in the database is indexed by up to five descriptors (key words or phrases). All of these descriptors are used as lead terms in the (permuted) subject index.
- *The "Organization Index" contains entries for all organizations and private researchers responsible for projects included in the Directory. Titles only are printed in entry number order.
- *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 contributors.

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 - Main Classes

Techniques and Equipment
Physical Sciences
Biomedical Sciences
Social Sciences
Fisheries and Aquaculture
Engineering
Resource Management
Operations
Cartographic Materials

Detailed Subject Classes

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

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
- Electrical engineering and communications
- Civil engineering and construction
- Mining engineering

Resource Management
- General
- Resource allocation and zoning
- Pollution and other environmental threats
- Marine park management
- Surveillance and enforcement
- Coastal zone management

Operations
- Shipping operations
- Ports and harbours
- Research and expedition management

Cartographic Materials
- General

Glossary of Abbreviations

ABRS	—	Australian Biological Resources Study
AMSTAC-FAP	—	Australian Marine Sciences and Technologies Advisory Committee - Funding Advisory Panel
AIMS	—	Australian Institute of Marine Science
ARGS	—	Australian Research Grants Scheme
BMR	—	Bureau of Mineral Resources, Geology and Geophysics
BRIAN	—	Barrier Reef Image Analysis System
CSIRO	—	Commonwealth Scientific and Industrial Research Organization
DAIA	—	Department of Aboriginal and Islander Affairs
d.w.t.	—	Dead weight tons
FAO	—	Food and Agricultural Organization (of the United Nations)
FIBEX	—	First International BIOMASS Experiment
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
HF	—	High-frequency
IOC	—	Intergovernmental Oceanographic Commission
IR	—	Infra-red
LNG	—	Liquid natural gas
NOAA	—	National Oceanic and Atmospheric Administration
OTH	—	Over-the-Horizon
PCB	—	Polychlorinated biphenyls
RAN	—	Royal Australian Navy
R.V.	—	Research Vessel
Scuba	—	Self-contained underwater breathing apparatus
SST	—	Sea Surface Temperature
UNESCO	—	United Nations Educational, Scientific and Cultural Organization
VIMS	—	Victorian Institute of Marine Sciences
VIMSIS	—	Victorian Institute of Marine Sciences Information System

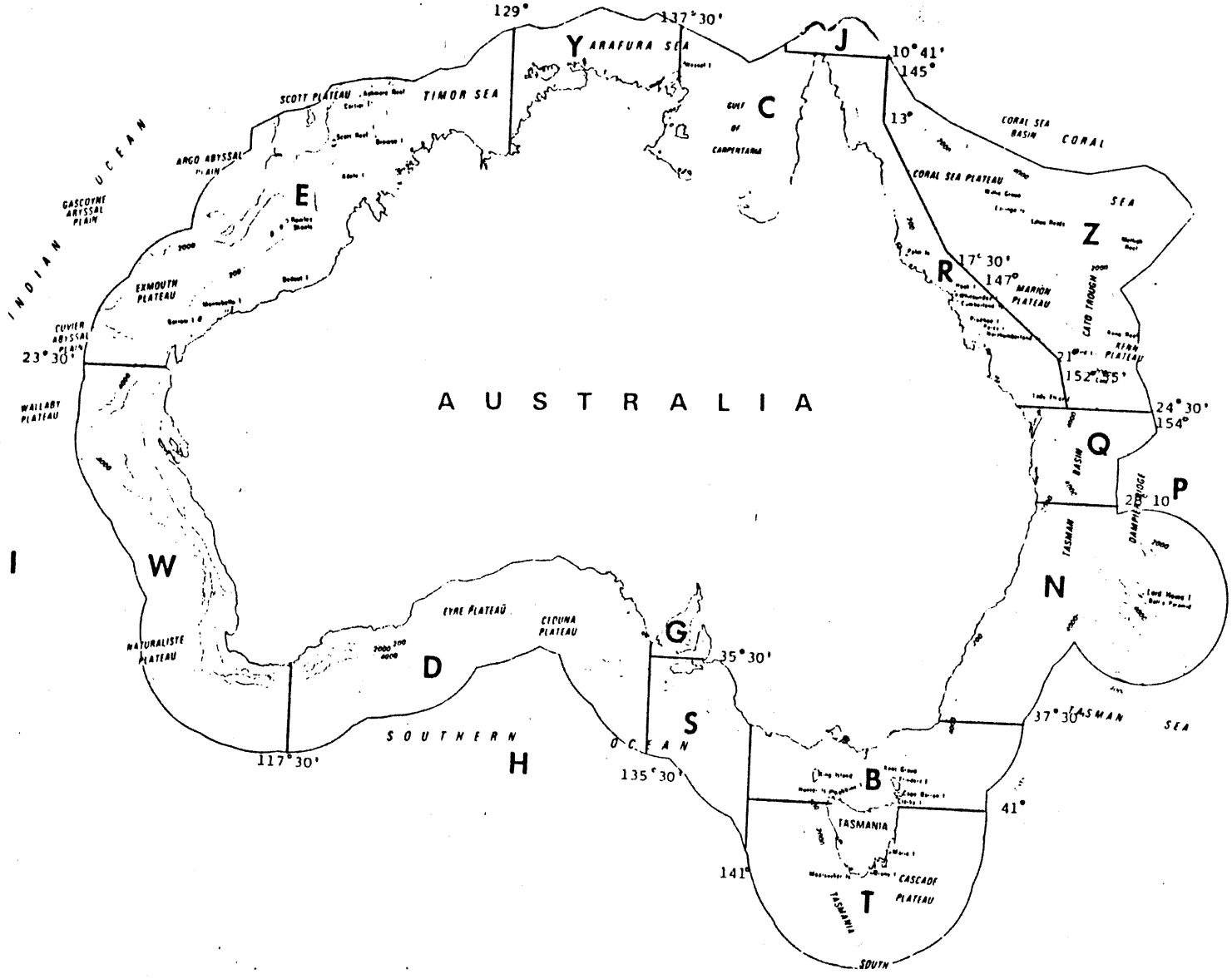
XRF — X-ray fluorescence (spectrometry)

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

1 Bibliographic Database of Coral Reef Molluscs.

PERIOD: January 1984 - December 1984

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

University of Queensland (Subcontract)
Departmen of Zoology,
St. Lucia, Qld 4067

PROJECT LEADERS: Dr W. Craik (077) 818811
Mr B. Long (07) 3771111

CONTACT OFFICER: Ms E. Eager (077) 818811

EXPENDITURE: $950 (this year), $950 (all years)

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

OBJECTIVE

To prepare a database of published material on Queensland coral reef molluscs suitable for transfer to the "REEF" database.

METHODOLOGY

The data set will be developed from existing coded references on cards. GBRMPA staff will be consulted to determine the date structure and system of indexing to allow selective searching of the references and ultimate transfer of the data set to "REEF".

STATUS

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

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Mollusca/Coral reefs/Bibliographies/

[GBRMPA110]

2 Bathymetric mapping programme - Great Barrier Reef.

PERIOD: July 1979 -

ORGANIZATION: Department of Resources and Energy
Division of National Mapping
P.O. Box 31
Belconnen, A.C.T. 2616

PROJECT LEADER: Mr P.W. O'Donnell (062) 525180

CONTACT OFFICER: Mr B.H. Willington (062) 525169

MANPOWER: 6.00 (this year), 24.00 (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 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

Refer map sales leaflet number 6.

CO-ORDINATION WITH OTHER PROJECTS

BMR Project .009 is conducted in conjunction with this programme.

GEOGRAPHIC REGION: R

SHIP TIME REQUIREMENTS: TSMV "Febrina" - 90 days

MAJOR DESCRIPTORS: Bathymetric surveys/Bottom topography/Charting/

[DNDE--002]

3 Separability of color aerial photographs and Landsat MSS data for Heron island reef and spectral signatures of coral reef feature, GBR.

PERIOD: December 1981 - September 1984

ORGANIZATIONS: James Cook University of North Queensland
Geography Dept.
P.O. James Cook University
Townsville, Qld 4810

CSIRO
Division of Water and Land Resources
P.O. Box 1666
Canberra City, A.C.T. 2601

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

PROJECT LEADERS: Dr D.L.B. Jupp (062) 465477
Assoc. Prof. D. Hopley (077) 814111
Ms D.A. Kuchler (077) 814111 (James C. Uni)

CONTACT OFFICER: Ms D.A. Kuchler

OBJECTIVES

1. To determine the separability of Color Aerial Photographic Data (1:12000) for coral reefs, GBR.
2. To determine the separability of LANDSAT MSS Data for coral reefs, GBR.

METHODOLOGY

Develop a nomenclature for coral reef features of the GBR. Devise a classification system : Reef Cover and Zonation; for use with Remotely Sensed Data, GBR. Use the BRIAN (Barrier Reef Image ANalysis) software package to compare mapped data from the ground, from Color Aerial Photographs (1:12000) and from a Landsat MSS image.

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.

CO-ORDINATION WITH OTHER PROJECTS

Co-ordinating with the BRIAN project at CSIRO Division of Water and Land Resources, Canberra under the leadership of Dr D.L.B. Jupp.

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Coral reefs/Spectral analysis/Aerial photography/Landsat/

[JAMESC066]

4 Cairns and Cormorant Pass mapping project.

PERIOD: June 1982 - June 1985

ORGANIZATION: Queensland Department of Mapping and Surveying
Division of Mapping
P.O. Box 234
North Quay, Qld 4000

PROJECT LEADER: Mr D. Paetzholdt (07) 2245774

EXTERNAL SUPPORT: Co-ordinator Generals Department - $200,000

OBJECTIVES

To map 62 islands and cays of the Cairns and Cormorant Pass sections at various scales. The maps are to be used for recreation, administrative and environmental purposes
10 sheets at 1:100000
42 sheets at 1:25000
62 islands at 1:1000, 1:2500 or 1:5000.

METHODOLOGY

Major control to be established using Doppler translocation; minor control using Tellurometer and Theodolite. Tide gauge readings will allow conversion of vertical datum to lowest astronomical tide. Compilation of mapping will involve photogrammetry with contour interval appropriate to map scale. Acquisition of new colour photography will facilitate a colour or B/W photographic background as appropriate.

STATUS

Field work for all islands (large scale mapping) has been completed. Orthophoto mapping of Lizard Island has been completed. L.A.T. results are now audited - their receipt will allow map completion to commence.

CO-ORDINATION WITH OTHER PROJECTS

Additional photography has been obtained on befalf of GBRMPA.
Exchange of repromat has taken place with A.S.O. (in relation to Lizard Island).

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Islands/Cays/Mapping/

[QDMS--005]

5 **Mapping of the Capricorn Section of the Great Barrier Reef.**

PERIOD: May 1981 - October 1983

ORGANIZATION: Queensland Department of Mapping and Surveying
Division of Mapping
P.O. Box 234
North Quay, Qld 4000

PROJECT LEADER: Mr E.J. Winnett (07) 2247107

EXPENDITURE: $212,862 (all years)

MANPOWER: 3.75 (all years)

OBJECTIVES

To map 13 islands of the Capricorn and Bunker groups at various scales. The maps will be used for recreation, administrative and environmental purposes.
Maps to be produced:
3 at 1: 100 000 scale
7 at 1: 25 000 scale
13 at 1: 2 500 scale.

METHODOLOGY

Field Operations:
Major mapping control was established by using Doppler satellite translocation of existing control;
Minor control was established using telurometer and theodolite. Lowest astronomical tide was established by tide gauge.
Map Compilation:
Topographic information with 1 metre contours will be derived using photogrammetry.

STATUS

3 at scale 1:100000 - completed; 7 at scale 1:25000 - completed; 13 at scale 1:2500 - 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.

LOCALITIES: Great Barrier Reef Marine Park - Capricornia Section; ;
Capricorn Group; Bunker Group

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Islands/Mapping/

[QDMS--001]

6* **Townsville transect.**

PERIOD: October 1981 - June 1984

ORGANIZATION: Queensland Department of Mapping and Surveying
Division of Mapping
P.O. Box 234
North Quay, Qld 4000

PROJECT LEADER: Mr R. Milliken (07) 2246077

OBJECTIVES

To produce 60 sheets of mapping over Needle, Arab, Kelso, Rib, Hopkinson, Slashers, John Brewer, Lodestone, Helix, Faraday, Dip, Coil Reef area.
Scale 1:5000 Format 3000 metres x 4000 metres.
For research by GBRMPA.

METHODOLOGY

Major control - MAGNAVOX MX1502
Minor control - Decca transponders.
Tide gauge readings used in conversion of echo sounding rolls. Compilation of mapping using photogrammetry with contour lines interpolated from the echo rolls.

STATUS

5 sheets completed.
55 awaiting funds becoming available.
Work should recommence approximately December 1983.

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

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Reefs/Mapping/

[QDMS--003]

7 Cairns North Hydrographic survey.

PERIOD: September 1984 - December 1986

ORGANIZATION: Royal Australian Navy
Hydrographic Office,
P.O. Box 1332,
North Sydney, N.S.W. 2061

PROJECT LEADER: Commanding Officer, HMAS Flinders

CONTACT OFFICER: Lieutenant Commander G.J. Bond (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 Aust. Map Grid. Vessels employed will be HMAS Flinders, HMAS Betano and one 10M 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.

LOCALITIES: Low Isles; Lizard Island

GEOGRAPHIC REGION: R

SHIP TIME REQUIREMENTS: 252

MAJOR DESCRIPTORS: Hydrographic surveys/Surveying/

[RANRL-008]

See: 225

8 Analysis of spectrographic data in the reef region.

PERIOD: September 1983 -

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

CSIRO
Division of Water and Land Resources,
P.O. Box 1666,
Canberra City, A.C.T. 2601

PROJECT LEADERS: Mr D.van.R. Claasen (077) 818811
Dr D.L.B. Jupp (062) 465477

CONTACT OFFICER: Mr D.van.R. Claasen

EXPENDITURE: $5,600 (this year), $16,840 (all years)

MANPOWER: .25 (this year), .50 (all years)

OBJECTIVE

Stage one is a pilot study to determine the extent to which Coastal Zone Color Scanner (CZCS) satellite data, together with the finer spatial resolution of LANDSAT Multi Spectral Scanner data, can detect and map near shore sea bottom, benthos, and water colour features of the Northern Great Barrier Reef Region. Further stages will use higher resolution airborne imagery as well as additional satellite images and more detailed field work to refine the technique.

METHODOLOGY

CZCS and LANDSAT images were classified and interpreted. The labelled classes were verified by reconnaissance field work using manta for rapid survey techniques.

STATUS

The pilot study has been completed. Initial results show that subject to local conditions the technique can identify and map concentrations of high percentage cover, submerged aquatic vegetation and water colour within the near-shore areas of the Great Barrier Reef Region. Discrimination of subsurface features was hampered by the coarse spatial resolution of the CZCS and the poorer spectral range of LANDSAT. Although the technique was of value operationally higher spectral and spatial resolution sensors would be more effective. This data has been acquired and will be further investigated.

LOCALITIES: Shelburne Bay; Bathurst Bay

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Landsat/Remote sensing/Coastal zone colour scanning/

[GBRMPA085]

9 **Techniques for underwater photogrammetry using simple cameras.**

PERIOD: May 1979 -

ORGANIZATIONS: University of Newcastle
Department of Civil Engineering and Surveying
Newcastle, N.S.W. 2308

Australian Institute of Marine Science

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

PROJECT LEADERS: Dr J.G. Fryer (049) 685628
Mr M.H. Elfick (049) 685507
Dr T. Done (077) 789211
Mr A Pearson (049) 20461

CONTACT OFFICER: Dr 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.
Examine methods of "through-water" photogrammetry.

GEOGRAPHIC REGIONS: N,R

MAJOR DESCRIPTORS: Photogrammetry/Charting/Underwater photography/Error analysis/

[UNINEW002]

10 Collaborative flow modelling study of the Great Barrier Reef.

PERIOD: December 1983 - December 1986

ORGANIZATIONS: Australian Institute of Marine Science
P.M.B. 3,
Townsville, Qld 4810

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

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

PROJECT LEADERS: Dr J.C. Andrews (077) 789211
Dr L. Bode (077) 814111
Mr G. Kelleher (077) 818811

CONTACT OFFICER: Dr J.C. Andrews

EXPENDITURE: $165,000 (this year), $350,000 (all years)

OBJECTIVES

1. To construct and validate numerical models of barotropic and baroclinic flows on the Queensland continental Shelf and slope, initially in central Great Barrier Reef Region.
2. To use models for understanding of fluid dynamics of central Great Barrier Reef Region and advection and dispersion in interior and boundary layers.
3. To use models to predict ocean response to environmental forcing.

METHODOLOGY

Analysis of tidal data, modification and establishment of James Cook University barotropic model, evaluation of baroclinic model, collection of appropriate field data for models and inclusion in model runs for objectives outlined above.

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Fluid dynamics/Mathematical models/Water circulation/Oceanographic data/

[AIMS--006]

11 Wave data collection along the Queensland coastline.

PERIOD: April 1974 -

ORGANIZATION: Beach Protection Authority
G.P.O. Box 2195,
Brisbane, Qld 4001

PROJECT LEADER: Mr H.V. MacDonald (07) 2278253

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]

12 Nutrient Replenishment in Hydrographers Passage.

PERIOD: July 1984 - December 1985

ORGANIZATIONS: CSIRO
Division of Oceanography,
CSIRO Marine Laboratories,
P.O. Box 21,
Cronulla, N.S.W. 2230

University of New South Wales
Faculty of Science,
P.O. Box 1,
Kensington, N.S.W. 2033

PROJECT LEADERS: Dr D. Airey (02) 5236222
Dr J. Middleton (02) 6623212

CONTACT OFFICER: Dr D. Airey

OBJECTIVES

1. To compare the nutrient enrichment mechanisms in Hydrographers Passage, which is wide and has a sill, with those previously examined by Thompson and Golding in Cook's Passage which is narrow.
2. To determine the difference in the nitrate replenishment on the spring and the neap flood tides, and silicate loss from lagoon waters on the ebb tides.
3. To assess the effect of internal waves on the quantity of nutrient rich water injected through the reef by tidal currents.
4. To assess the importance of tidally pumped nutrients against the nutrient enrichment from large-scale upwelling as observed by M. Furness and J. Andrews (AIMS).

METHODOLOGY

Water samples will be collected and temperature, salinity and nitrate concentrations measured. The field work will be in three phases: Cruise (1) in October 1984 to deploy tidal gauges and current meters, collect water samples at a series of stations and for a number of tidal cycles; cruise (2) in March 1985 to pick up moored instruments and repeat water sampling; and cruise (3) later in 1985 to examine the uplift of the pycnocline at the shelf break due to internal waves, by repeatedy sampling a profile at the shelf break and a transect perpendicular to Hydrographers Passage.

CO-ORDINATION WITH OTHER PROJECTS

Dr Airey is collaborating with Dr M. Tomczak (University of Sydney) to develop a sampler to collect water for subsequent nutrient analysis. This development is funded by MSTGS.

LOCALITY: Hydrographers Passage

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Nutrients/Water currents/Tidal currents/

[CSIRO-072]

13* Study of Australian coastal water turbidity.

PERIOD: July 1975 -

ORGANIZATION: Defence Science and Technology Organization
Electronic Research Laboratory
G.P.O. Box 2151
Adelaide, S.A. 5001

PROJECT LEADER: Dr D.M. Phillips (08) 259303

OBJECTIVES

1. To measure spatial, temporal and spectral variations of Australian coastal water turbidity.
2. To determine the main environmental factors influencing water turbidity.
3. To develop airborne techniques for determining water turbidity.

METHODOLOGY

1975 - 1979 Measurement of beam attenuation coefficient with a portable underwater transmissometer. Identification of environmental factors influencing water turbidity.
1980 Development of techniques for determination of water turbidity with a Laser Airborne Depth Sounder. Monte-Carlo modelling of airborne turbidity measurement.

STATUS

1. A reliable portable underwater transmissometer has been made.
2. Measurements of the horizontal, vertical, and spectral distribution of beam attenuation coefficient in South Australian and North Queensland coastal waters have been made.
3. Preliminary measurements of water turbidity have been made with a Laser Airborne Depth Sounder.

CO-ORDINATION WITH OTHER PROJECTS

Limited contact with Flinders University of SA, University of Adelaide, James Cook University, and CSIRO Division of Plant Industry.

GEOGRAPHIC REGIONS: G,C,J,R

SHIP TIME REQUIREMENTS: 10 days

MAJOR DESCRIPTORS: Turbidity/Regional variations/Environmental factors/Remote sensing/Mathematical models/

[DSTO--002]

14 Drift card study of Great Barrier Reef surface currents.

PERIOD: January 1981 -

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

James Cook University of North Queensland (Subcontract)
Department of Marine Biology,
Post Office, James Cook University,
Townsville, Qld 4811

PROJECT LEADERS: Dr W. Craik (077) 818811
Dr J.D. Collins (077) 814111

CONTACT OFFICER: Mr R. Kenchington (077) 818811

EXPENDITURE: $1,000 (this year), $67,040 (all years)

OBJECTIVES

To produce an integrated picture of drift over the Great Barrier Reef Lagoon.
To establish correlations between drift and wind patterns.

METHODOLOGY

A total of 80,000 drift cards released over an 18 month period through the Great Barrier Reef Region by coastwatch aircraft. Data obtained for drift cards and wind data for the estimated period of drift were analysed by computer to obtain drift patterns.

STATUS

All cards have been dropped and data analysed. Report to be completed and submitted to GBRMPA.

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Wind-driven currents/Drift cards/Oceanographic data/

[GBRMPA035]

15 Man made noise in the ocean.

PERIOD: January 1981 -

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

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

PROJECT LEADERS: Dr W. Craik (077) 818811 (GBRMPA)
Dr G. Allen (077) 814111 (JCU)

CONTACT OFFICER: Dr W. Craik

EXPENDITURE: $3,000 (all years)

MANPOWER: 0.20 (this year)

OBJECTIVES

1. To measure noise spectra of vessels.
2. To relate ship noise to ambient levels in the sea at various frequencies.

METHODOLOGY

Pressure sensitive detectors linked to a portable spectral analyser system carried in small craft will be used to measure ambient sea noise and boat noises between the mainland and the Great Barrier Reef.

STATUS

Report received.

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Sound sources/Ships/Ambient noise/

[GBRMPA013]

16 Evaluation of river mixing processes.

PERIOD: January 1983 - December 1986

ORGANIZATION: James Cook University of North Queensland
Physics Department
Post Office
Townsville, Qld 4811

PROJECT LEADER: Dr M.L. Heron (077) 814111

EXPENDITURE: $22,000 (all years)

MANPOWER: 4.00 (all years)

EXTERNAL SUPPORT: MSTGS - $22,000

OBJECTIVE

To understand the interactions between freshwater flood plumes and the lagoon water of the Great Barrier Reef in terms of currents driven by flood-plume momentum and buoyancy, and winds and tides.

METHODOLOGY

The two-station coastal ocean surface radar system is being deployed in Bowling Green Bay and Halifax Bay during Burdekin floods to observe surface current velocities. CTD transects and profiles are being used to map salinity gradients. The second phase of the project applies the same techniques in the Johnstone River outflow.

STATUS

Hardware for the two-station COSRAD system is operational and the software allows automatic surface-current mapping. Preliminary observations have been made at all sites. Software development on a different project during 1984 is now available to track Lagrangian trajectories.

CO-ORDINATION WITH OTHER PROJECTS

Australian Institute for Marine Science study of inshore circulation in Bowling Green Bay by observations and numerical modelling. Schedules for observation are being coordinated and some logistics shared.

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: River plumes/Coastal lagoons/Water mixing/

[JAMESC062]

17 Hydrodynamic studies of water movements within the Great Barrier Reef region.

PERIOD: July 1980 - December 1983

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

PROJECT LEADERS: Prof K.P. Stark (077) 814270
Dr L. Bode (077) 814214

CONTACT OFFICER: Prof K.P. Stark

EXPENDITURE: $47,000 (this year), $113,915 (all years)

EXTERNAL SUPPORT: AMSTAC-FAP - $23,960 (1980/81)

OBJECTIVE

To provide information concerning gross water movements on the Queensland continental shelf and in the Coral Sea in the vicinity of the Great Barrier Reef and, in addition, to initiate studies of detailed water movements over selected areas. The first area studied has included the Capricornia Section of the Great Barrier Reef region and solutions involve circulations driven by wind, tide and major currents.

METHODOLOGY

The project uses modified and further-developed versions of an existing two-dimensional (depth integrated) numerical hydrodynamic model SURGE developed by Harper, Sobey and Stark at James Cook University to study the development of meteorological storm surges associated with tropical cyclones. This model has not been used previously for tidally driven circulations and some modifications are incorporated. Early studies will be undertaken (a) in the Capricorn-Bunker group, (b) in the Mackay-Broad Sound area and (c) in an area adjacent to Townsville.

STATUS

The initial phase of the project has been successfully developed and a number of two-dimensional tidal and wind- driven circulations in the Great Barrier Reef region have been produced. Some fundamental numerical problems have been overcome and the initial results provide a significant contribution to the understanding of the hydrodynamic environment. Particular attention has been focussed in the first phase on the M_2 tidal response in the Capricornia region. This has been extended to both the Mackay and Central sections of the Great Barrier Reef Region, while preliminary modelling has been effected in the Northern section. In addition a separate study of the tides of the Coral Sea is being

conducted, while the effects of the reef on tides in the Mackay section is a joint project with Dr. J. Middleton of the University of N.S.W.

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: Capricorn Group; Bunker Group; Broad Sound; Townsville

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Continental shelf circulation/Hydrodynamics/Mathematical models/

[JAMESC002]

18* **Extreme water level statistics.**

PERIOD: February 1983 - December 1983

ORGANIZATIONS: Queensland Beach Protection Authority
G.P.O. Box 2195
Brisbane, Qld 4001

Blain, Bremner and Williams Pty Ltd
Castlemaine St
Milton, Qld 4064

PROJECT LEADERS: Mr H.V. Macdonald (07) 2278253
Mr C. McMonagle (07) 3699144

CONTACT OFFICER: Mr H.V. Macdonald

OBJECTIVE

To prepare reliable extreme water level statistics for nine locations on the Queensland coast. Extreme water levels include tides, storm surge and wave set-up. Locations are Weipa, Cooktown, Townsville, Innisfail, Ingham, Mackay, Bowen, Rockhampton, Gold Coast.

METHODOLOGY

Monte-Carlo simulations of storm surge statistics based on numerical model results for storm surges prepared by James Cook University in 1977.

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: C,R,Q

MAJOR DESCRIPTORS: Sea level/Storm surges/Water waves/Tides/

[QLDBPA013]

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19 **Dynamical study of southern Barrier Reef circulation.**

PERIOD: January 1983 - December 1985

ORGANIZATION: University of New South Wales
School of Mathematics,
PO Box 1,
Kensington N.S.W. 2033

PROJECT LEADER: Dr J.H. Middleton (02) 6973176

EXTERNAL SUPPORT: MSTGS - $35,510

OBJECTIVE

To gain a quantitative assessment of the role that tides, wind forcing, long period waves and the coral sea play in the circulation of the southern Barrier Reef lagoon, and to parameterize these features in such a way that useful predictions might be made for the future.

METHODOLOGY

Techniques of time series and tidal analysis will be used to compare salient features of current and sea level data with existing theoretical and numerical models.

STATUS

All instruments were deployed in June 1982 and retrieved in December, 1983. Theoretical models are being developed. Data analysis is presently being undertaken.

GEOGRAPHIC REGIONS: R,Z

SHIP TIME REQUIREMENTS: Instruments deployed by Sprightly and to be retrieved by trawler.

MAJOR DESCRIPTORS: Wind-driven circulation/Tides/Mathematical models/

[UNINSW033]

20 Dynamics of the northern Barrier Reef lagoon.

PERIOD: July 1981 - December 1984

ORGANIZATION: University of New South Wales
School of Mathematics,
PO Box 1,
Kensington N.S.W. 2033

PROJECT LEADER: Dr J.H. Middleton (02) 6973176

EXTERNAL SUPPORT: MSTGS - $124,977

OBJECTIVE

To understand the dynamics of the northern Barrier Reef lagoon with emphasis on wind driven circulation and tides, and to successfully parameterize the most important features of these through a comparison with appropriate barotropic and baroclinic models.

METHODOLOGY

Current meters and tide gauges were deployed in conjunction with those of Dr R.E. Thomson (IOS). A number of techniques of time series and tidal analysis will be used to facilitate comparison of theory with observation.

STATUS

UNSW instruments deployed and retrieved over two periods November, 1981 - April 1982 and April 1982 - October 1982. Data analysis complete. Manuscripts submitted for publication.

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

CO-ORDINATION WITH OTHER PROJECTS

This project is being conducted jointly with Dr R.E. Thomson (IOS).

GEOGRAPHIC REGION: R

SHIP TIME REQUIREMENTS: Instruments deployed from RV Lady Basten (AIMS).

MAJOR DESCRIPTORS: Wind-driven circulation/Tides/Mathematical models/

[UNINSW034]

21 **Shelf circulation between Lizard Island and Carter Reef, Northern Great Barrier Reef.**

PERIOD: January 1981 - December 1984

ORGANIZATIONS: University of New South Wales
Oceanography Group,
School of Mathematics,
P.O. Box 1,
Kensington, N.S.W. 2033

Australian Museum
Ichthyology Department,
P.O. Box A285,
Sydney South, N.S.W. 2000

Lizard Island Research Station
PMB No. 37,
Cairns, Qld 4870

PROJECT LEADERS: Ms C. Frith (02) 6973176
Dr J.M. Leis (02) 3398111 (Ext 262)
Dr B. Goldman (070) 534500

CONTACT OFFICER: Ms C. Frith

EXTERNAL SUPPORT: GBRMPA - $2,750 (1983-84)
MSTGS

OBJECTIVE

To study the seasonal and tidal variations in water circulation on the continental shelf between Lizard Island and Carter Reef.

METHODOLOGY

Current speed and direction were measured 10M above the bed at 3 stations during 1981 and 1982. Data were collected for 12 months at stations 1 and 3 and for 2 years at station 2. Tidal constants were estimated using standard computer packages and tidal flows compared between the 3 stations. Filtered current data were used to describe long-term circulation and coherence with wind data.

STATUS

All data analysis completed. Manuscript 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.

LOCALITIES: Lizard Island; Carter Reef

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Continental shelf/Oceanographic data/Water circulation/Water currents/

[UNINSW036]

22 Tidal flow across Reefs.

PERIOD: October 1984 -

ORGANIZATIONS: University of New South Wales
School of Mathematics,
P.O. Box 1,
Kensington, N.S.W. 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 the Hydrographers passage in October 1984 will provide data and tidal analyses for each location and will provide constituent data. This 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

SHIP TIME REQUIREMENTS: 10 days 1984, 10 days 1985.

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

[UNINSW037]

23 Modelling the tides of the Coral Seaway.

PERIOD: October 1980 -

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

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

EXPENDITURE: $2,000 (this year), $16,000 (all years)

MANPOWER: 0.20 (this year), 1.20 (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 is being refined progressively as more field data become available.

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]

24 Heat Storage and Surface Fluxes of the Coral Sea.

PERIOD: December 1984 - December 1985

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

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

PROJECT LEADERS: Mr M. Nunez (002) 202487
Mr G. Meyers (002) 206208

CONTACT OFFICER: Mr K. Michael (002) 202487 (UNITAS)

EXPENDITURE: $3,000 (this year)

MANPOWER: 1.00 (this year)

OBJECTIVES

To observe net heat fluxes at the sea surface and determine to what extent surface fluxes control heat storage in the surface layer of the ocean.
To examine the feasibility of using satellite data to estimate surface heat fluxes.

METHODOLOGY

Heat storage in the ocean is measured by expendable bathythermographs launched from ships of opportunity.
Radiative fluxes are measured by pyranometers at islands. Latent and sensible heat fluxes are measured by bulk aerodynamic methods, which require observations of wind, humidity, air and sea temperature.
Microwave measurements recorded on satellites are sensitive to the distribution of moisture in the atmosphere. The possibility of using these satellite data to replace ground based observations of humidity will be tested.
Isolation at the sea surface will be determined by atmospheric reflectivity measured aboard satellites.

CO-ORDINATION WITH OTHER PROJECTS

CSIRO - XBT Ship of Opportunity program.

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Heat storage/Thermodynamics/Ocean circulation/Air-water interface/Satellites/

[UNITAS010]

See also: 57, 59*

25* Organic chemistry of seawater and marine sediments.

PERIOD: October 1982 -

ORGANIZATION: CSIRO
Division of Oceanography
G.P.O. Box 1538
Hobart, Tas. 7001

PROJECT LEADER: Dr J.K. Wolkman (002) 202490

EXPENDITURE: $90,000 (this year), $90,000 (all years)

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

OBJECTIVE

The objectives of the project are to identify a range of organic compounds in seawater, surface marine sediments, and marine biota such as unicellular algae and zooplankton. The compound classes studied include fatty acids, sterols, hydrocarbons, fatty alcohols, wax esters, steryl esters, triacylglycerols and ketones. These data will be used to fingerprint different water masses, to investigate selected food-chain interrelationships, to define the factors affecting the production and utilisation of lipids in the sea, to study the transport of lipids to the sea floor, and to investigate the degradation of organic matter in surface sediments.

METHODOLOGY

Total lipids are extracted with organic solvents and then separated into individual lipid classes by column chromatography on silcic acid. Each fraction is then analysed by capillary gas chromatography to identify and quantify the lipids present. Selected samples are also analysed by capillary gas chromatography-mass spectrometry. The concentrations of each lipid class in the total extract is determined by Iatroscan TLC-FID.

STATUS

Samples of cultured marine algae, marine sediments and zooplankton have been obtained and are being analysed. Further samples of seawater particulates and zooplankton will be obtained in July 1983, during a cruise of R.V. Sprightly from Townsville to Sydney.

CO-ORDINATION WITH OTHER PROJECTS

Collaboration: Dr H.J. Bavor Jnr., Hawkesbury Agricultural College - microbial aspects of marine sediments. Dr R.E. Summons, A.N.U. - carbon flow in coral - zooxanthellae symbiosis. Dr F.T. Gillan A.I.M.S. - organic geochemistry of marine sediments.

GEOGRAPHIC REGIONS: B,N,R,Z,Q

SHIP TIME REQUIREMENTS: 14 days

MAJOR DESCRIPTORS: Biota/Sediment analysis/Organic constituents/Biochemical analysis/

[CSIRO-067]

26 **Water quality of the narrows and associated estuaries adjacent to the Rundle oil shale project.**

PERIOD: May 1981 -

ORGANIZATION: Esso Australia Ltd
Coal & Synthetic Fuels Department,
Rundle Project Group,
127 Kent Street,
Sydney, N.S.W. 2000

PROJECT LEADER: Mr R.D. Tait (02) 2362187

EXPENDITURE: $5,000 (this year), $125,000 (all years)

MANPOWER: 0.20 (this year), 1.70 (all years)

OBJECTIVE

To establish baseline water quality for the narrows, central Queensland, and investigate water quality changes due to inflow of freshwater through several small estuaries.

METHODOLOGY

Monthly samplings from up to 30 sites within the narrows and freshwater streams were collected for analysis by contract laboratories. Analysis for anions, cations, carbon, nutrients, trace metals, and some hydrocarbons were carried out on all samples. Samples were collected over different tidal and freshwater input conditions.

STATUS

Field work is complete, computer analysis and report preparation is progressing.

LOCALITY: Rundle

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Water analysis/Water quality/Oil shale/Environmental impact/

[ESSO--002]

27 **Novel Compounds from Marine Organisms.**

PERIOD: February 1984 -

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

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

EXPENDITURE: $600 (this year), $600 (all years)

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

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.

STATUS

Novel brominated acetylenic acids from the sponge *Xestospongia testudinaria* are being investigated.

GEOGRAPHIC REGIONS: R,Q

MAJOR DESCRIPTORS: Organic compounds/Marine organisms/Biologically active compounds/ Chromatographic techniques/Spectroscopic techniques/

[GRIFFI012]

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28 The isolation of novel compounds from marine invertebrates.

PERIOD: January 1978 -

ORGANIZATION: James Cook University of North Queensland
Department of Chemistry and Biochemistry
Post Office
Townsville, Qld 4811

PROJECT LEADERS: Dr J.C. Coll (077) 814533
Dr B.F. Bowden

CONTACT OFFICER: Dr J.C. Coll

EXPENDITURE: $24,800 (this year), $209,800 (all years)

MANPOWER: 2.50 (this year), 20.00 (all years)

EXTERNAL SUPPORT: ARGS - $191,880 (1981-1984)

OBJECTIVE

The project seeks new and interesting compounds from marine invertebrates (especially soft corals). It also looks at the biosynthetic pathways used in the elaboration of selected natural products, and of the role in this of each partner in the symbiosis.

METHODOLOGY

Organisms are collected, frozen freeze-dried and extracted. Chromatographic separation affords pure substances which are identified by spectroscopic and chemical approaches.

STATUS

The project is in the second six year cycle.

CO-ORDINATION WITH OTHER PROJECTS

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

GEOGRAPHIC REGION: R

SHIP TIME REQUIREMENTS: 6 days

MAJOR DESCRIPTORS: Anthozoa/Octocorallia/Biochemistry/Chemical analysis/Symbiosis/

[JAMESC044]

29* **To investigate the structure, metabolic pathway, nutritional and clinical use of marine compounds and to obtain an understanding of the processes involved in their ecology and evolution.**

PERIOD: January 1982 -

ORGANIZATION: Swinburne Institute of Technology
John Street
Hawthorn, Vic. 3122

PROJECT LEADER: Dr L.Y. Misconi (03) 8198537

OBJECTIVES

To examine the lipid composition and fatty acid distribution of sea cucumber and its dietary effect on the people of the South Pacific.
To undertake a basic study of the structure and biosynthesis of some marine natural products including polymeric pigments which are not well understood.
To screen new compounds from marine organisms for biological activity and clinical use.
To determine the amino acid sequences of a number of blood proteins.

METHODOLOGY

Various extraction procedures
Protein analysis techniques and sequence analysis.
Mutagenicity, biocidal activity and animal tests.

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Holothuroidea/Chemical compounds/Biochemistry/Chemical analysis/Pharmacology/

[SWIT--001]

30 **Estuarine and seawater chemistry.**

ORGANIZATION: University of Melbourne
Marine Chemistry Laboratory,
Department of Inorganic Chemistry,
Parkville, Vic. 3052

PROJECT LEADER: Dr J.D. Smith (03) 3451844

MANPOWER: 1.00 (this year)

OBJECTIVE

Understanding of the factors controlling the composition of seawater, especially the micronutrient and redox sensitive elements. Modelling of the chemical effects of mixing river and seawaters, including processes removing components of river waters from solution.

METHODOLOGY

Field and laboratory measurements of the chemical properties of seawater, river water, and intermediate mixtures. Modelling of the chemical behaviour of estuaries. Study of sediment composition.

GEOGRAPHIC REGIONS: A,B,R

MAJOR DESCRIPTORS: Estuaries/Sea water/Chemical composition/Water mixing/

[UNIMEL063]

31 **Multielement analysis of marine sediments and tissues of marine organisms.**

ORGANIZATION: University of Melbourne
Marine Chemistry Laboratory,
Department of Physical Chemistry,
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 integrators 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/

[UNIMEL064]

32 **Radionuclides in sediments: pb-210 sediments chronology and interactions of benthic organisms with radionuclides in sediment.**

ORGANIZATIONS: University of Melbourne
Depártment of Inorganic Chemistry,
Marine Chemistry Laboratory,
Parkville, Vic. 3052

Australian Atomic Energy Commission
Private Mail Bag
P.O. Sutherland, N.S.W. 2232

PROJECT LEADERS: Dr J.D. Smith (03) 3451844
Mr D. Davy (02) 5433241 or 5433686

CONTACT OFFICER: Dr J.D. Smith

MANPOWER: 1.00 (this year)

EXTERNAL SUPPORT: AINSE

OBJECTIVE

Measure and model the distribution of naturally occurring U-238 decay series radionuclides in marine and lake sediments. Use the model to establish sediment chronology based on accurate estimates of unsupported Pb-210. Comparison using Cs-137 dating. Establish the interactions of the radionuclides with benthic organisms, the effects on sediment dating, and transfer of radionuclides into food chains.

METHODOLOGY

Alpha- and gamma- spectrometry, liquid scintillation counting.

STATUS

Refined techniques for Pb-210 dating based on Po-210 alpha spectrometry, with corrections based on Ra-226 measurement are established. Papers in preparation.

GEOGRAPHIC REGIONS: A,B,R

MAJOR DESCRIPTORS: Benthos/Sediment analysis/Radioisotopes/Dating/Food chains/

[UNIMEL061]

See also: 45

33* Environmental geochemistry and climatic reponse of sediments and corals. 10°-20°S.

PERIOD: September 1980 -

ORGANIZATIONS: Australian National University
Environmental Geochemistry Group
Research School of Earth Sciences
P.O. Box 4
Canberra, A.C.T. 2600

CSIRO
Division of Land Use Research
Canberra, A.C.T. 2600

Queensland Geological Survey
44 George Street
Brisbane, Qld 4000

PROJECT LEADERS: Dr T. Torgersen (062) 493407
Mr H.A. Nix
Dr D.E. Searle

CONTACT OFFICER: Dr T. Torgersen

EXPENDITURE: $150,000 (this year)

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

EXTERNAL SUPPORT: AMSTAC-FAP - $35,517

OBJECTIVES

To study the Quaternary climatic history of the Gulf of Carpentaria. To investigate the modern sediments and climatic signals contained in the near-shore sediments and corals of the Great Barrier Reef and to evaluate the environmental geochemistry and climatic correlation of sedimentary material in the Gulf of Carpentaria.
This study will enable a detailed climatic evaluation of the marine and non-marine sedimentary sequences expects. Such a study is necessary to serve as a link between mid-latitude and tropical controls on Quarternary atmospheric circulations.

METHODOLOGY

The climatic response of the sedimentary environments manifests itself with variations in stable isotope ratios, (δO^{18}, δC^{13}, δH^{2}), trace elements, organic fraction, grain size, clay mineralogy, floral and faunal abundances, pollen species, dessication, etc. The occurrance of these changes can be accurately dated by a variety of radiochemical means. This work will concentrate on isotopic, radiochemical and trace element measurements.

STATUS

A 25-day cruise in the Gulf of Carpentaria has been completed with 1600 km of seismic lines, 35 coring stations, and 102 grab samples. This work is now being synthesized. A review of the Quaternary geology of the Gulf is in press as is an isotopic and chemical study of Princess Charlotte Bay. The chemical and isotopic response of porites coral in the Townsville area has been studied and is now in preparation.

CO-ORDINATION WITH OTHER PROJECTS

The project is co-ordinated with some projects underway at the Australian Institute of Marine Science.

GEOGRAPHIC REGIONS: C,R

SHIP TIME REQUIREMENTS: 14 days

MAJOR DESCRIPTORS: Palaeoclimatology/Stratigraphy/Geochemistry/Radioactive dating/Environmental factors/

[ANU---003]

34 Stable-isotope study of palaeoclimate and environmental geochemistry of the Great Barrier Reef.

PERIOD: December 1979 - June 1985

ORGANIZATION: Australian National University
Research School of Earth Sciences, and Department of Biogeography and Geomorphology, Research School of Pacific Studies
P.O. Box 4
Canberra, A.C.T. 2601

PROJECT LEADERS: Dr A.R. Chivas (062) 493247 or (062) 494770
Dr J. Chappell (062) 492235

CONTACT OFFICER: Dr A.R. Chivas

EXPENDITURE: $25,000 (this year), $200,000 (all years)

MANPOWER: 3.50 (this year), 13.00 (all years)

EXTERNAL SUPPORT: MSTGS - $98,573
AIMS (Some ship time.)

OBJECTIVES

To investigate past salinities and surface water temperatures analysed on a monthly to seasonal basis from carbon- and oxygen isotope variations in coral and mollusc growth-bands. These data will provide an important baseline for interpreting the growth history of the Great Barrier Reef.
Other specific aims include resolution of certain aspects of the global carbon cycle, including measurement of atmosphere-ocean exchange coefficients, investigation of aspects of reef metabolism, and an extension to study past hydrologic changes in northern Queensland.

METHODOLOGY

Measurement of $\delta^{13}C$ and $\delta^{18}O$ variations of calcium carbonate precipitated by corals and *Tridacna* (the giant clam) from samples covering 3 time-intervals: the last 150 years; the last 6000 years; and if available, from late Cenozoic times. Collection sites for the last 600 years are restricted to the Palm Islands. For the last 6000-year interval, five sites, evenly distributed from Cape York to Lady Elliot Island have been chosen. Carbon budget and climatic information for the last 100 years will be derived from δD, $\delta^{13}C$ and $\delta^{18}O$ measurements of *Auracaria* (Hoop Pine) and ^{13}C and ^{18}O contents of corals and clams, all of which were collected from the Palm Islands.

STATUS

Sampling for 100-year time frame complete. Sampling of 6000 yr time frame for microatolls and shingle-ridge sequences from Nymph, Low Wooded, West Hope, Curacoa, Whitsunday, and Lady Elliot Islands is complete. Radiocarbon dating complete for most sites. Isotopic analyses complete for some sites. Work being finalized, 5 papers published.

LOCALITIES: Great Palm Island; Lady Elliot Island; Whitsunday Islands; Curacoa Island; Nymph Island; Low Wooded Island; West Hope Island

GEOGRAPHIC REGION: R

SHIP TIME REQUIREMENTS: 8

MAJOR DESCRIPTORS: Palaeoclimatology/Geochemistry/Environmental factors/Radioactive dating/Geological history/

[ANU---006]

35 Bioerosion of coral substrates.

PERIOD: January 1980 - December 1985

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

PROJECT LEADER: Dr P.A. Hutchings (02) 3398243

EXPENDITURE: $20,873 (this year), $54,595 (all years)

MANPOWER: 1.50 (this year), 6.00 (all years)

EXTERNAL SUPPORT: AMSTAC - $62,139 (1980 - 15968; 1981 - 15848; 1982 - 1900; 1983 - 28423.)

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.

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 currently being analysed.

CO-ORDINATION WITH OTHER PROJECTS

A Ph.D. student funded by GBRMPA to study bioerosion in the Capricornia section of GBR.

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Coral reefs/Boring organisms/Bioerosion/

[AUSMUS004]

36 Biologic Reef Destruction - Processes, Products and Rates (PhD study).

PERIOD: August 1983 - August 1986

ORGANIZATIONS: Australian National University
Department of Geology,
P.O. Box 4,
Canberra, A.C.T. 2601

Australian Museum
P.O. Box A285,
Sydney South, N.S.W. 2000

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

PROJECT LEADERS: Mr W.E. Kiene (062) 494303 (ANU)
Dr K.A.W. Crook
Dr P.A. Hutchings (02) 3399243 (AUS MUS)
Dr P.J. Davies (062) 499321 (BMR)

CONTACT OFFICER: Mr W.E. Kiene

EXPENDITURE: $14,383 (this year), $27,458 (all years)

MANPOWER: 1.00 (this year), 2.00 (all years)

EXTERNAL SUPPORT: GBRMPA - $45,149 (grant to ANU for Mr W.E. Kiene (PhD Scholar))

OBJECTIVE

To define the processes, products and rates of biologic destruction on the Great Barrier Reef. The principle bioeroders and their rates of erosion in different environments on reefs at different stages of evolution are being investigated. This data will be used to construct a model of the role bioerosion plays in the growth and development of the Great Barrier Reef.

METHODOLOGY

Natural coral substrates have been prepared and attached to frames in reef slope, reef flat and lagoon environments in Llewellyn, One Tree and Wreck Reefs in the southern Great Barrier Reef, from these substrates collections are being made of infaunal borer communities over a period of two years. Measurements are being made of the amounts of erosion on these substrates caused by organisms.

STATUS

Experiments were established in February 1984 and first substrate collections were made in September 1984. Analytical techniques have been developed to extract organisms and the measurement of the volume of material eroded from substrates. Initial results show significant differences in bioerosion and bioeroders in different reef environments. Mapping and sampling of reef bioeroder habitats has also begun.

CO-ORDINATION WITH OTHER PROJECTS

Bioerosion studies by Australian Museum at Lizard Island

LOCALITIES: Llewellyn Reef; One Tree Island Reef; Wreck Reef

GEOGRAPHIC REGION: R

SHIP TIME REQUIREMENTS: 10 (shark cat)

MAJOR DESCRIPTORS: Coral reefs/Bioerosion/

[ANU---014]

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

PERIOD: March 1980 - December 1984

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: AMSTAC-FAP - $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

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

James Cook University

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Coral reefs/Growth/Stability/Reef formation/Environmental factors/

[BMR---010]

38 Inter-reefal studies to investigate the geological development of the central Great Barrier Reef.

PERIOD: July 1981 - December 1984

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

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

CONTACT OFFICER: Dr P.J. Davies

EXPENDITURE: $200,000 (this year), $390,500 (all years)

MANPOWER: 4.50 (this year), 6.00 (all years)

EXTERNAL SUPPORT: QFMRAC - $30,000 (Total of 60,000 in 1981-83 also 80000 by Division of National Mapping for boat time in 1981/82.)
AMSTAC-FAP

OBJECTIVE

To establish the structure and stratigraphy of the inter-reef areas so as to extend the ideas on reef growth developed from modern reef studies, to encompass the whole reef province as it exists today and has developed during the late Cainozoic.

METHODOLOGY

Coring, dredging, magnetometer profiling and sparker reflection profiling in inter-reefal areas of the central GBR.

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.

CO-ORDINATION WITH OTHER PROJECTS

James Cook University

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Coral reefs/Sediments/Stratigraphy/Geological history/Reef formation/

[BMR---009]

39 Study of Inner Shelf Sediments, Central Great Barrier Reef (MSc study).

PERIOD: December 1982 - June 1984

ORGANIZATIONS: Bureau of Mineral Resources, Geology and Geophysics
Marine Geology,
Cnr Constitutional Avenue and Anzac Parade,
Canberra, A.C.T. 2600

Australian National University
Geology Department,
P.O. Box 4,
Canberra, A.C.T. 2601

PROJECT LEADERS: Dr P.J. Davies (062) 499345 (BMR)
Dr K.A.W. Crook (062) 492059
Mr J. Cucuzza

CONTACT OFFICER: Dr P.J. Davies

OBJECTIVE

To investigate sediments obtained during a shallow coring programme. Determine environments of deposition and the lithology/stratigraphy to the high resolution 'boomer' seismic surveys.

METHODOLOGY

1. Cores obtained using a vibrocorer. Cores subsequently split and logged. Detailed grain size analysis were carried out on representative sub-samples. Each fraction studied under binocular microscope.
2. The lithology/ stratigraphy will be correlated to the seismic sections. It is anticipated that synthetic seismograms will be computed to aid this correlation.

STATUS

A total of 17 cores were obtained from an area stretching from the mouth of the Burdekin to the Great Palms Island. Modern marine deposition dominates the stratigraphy in the cores. Core lengths ranged from 0.71M to 3.75M. Holocene trangressive units have been recognised and are thin. A pre-Holocene surface was penetrated in several of the cores.

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 analysis/Stratigraphy/Core analysis/

[BMR---022]

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

ORGANIZATION: Geological Survey of Queensland
Chief Government Geologist,
GPO Box 194,
Brisbane, Qld 4001

PROJECT LEADER: Dr V. Palmieri (07) 2244166 or 2244929

CONTACT OFFICER: Mr P.J.G. Fleming (07) 2244940

OBJECTIVE

To identify associations of foraminifers and to determine distribution patterns, enviromental significance and evolutionary trends of benthic and planktonic assemblages from the subsurface Tertiary and Quaternary to the relict and recent associations.

METHODOLOGY

Qualitative and quantitative analysis of Foraminiferida from sea botton sediments; drillhole core, piston core and vibro core samples.

STATUS

Results obtained during 1983/84 include the identification of foraminifera biotopes in Moreton Bay; of assemblages of foraminifera denoting hyposaline conditions in the Late Quaternary of the Gulf of Carpentaria; and of a hiatus in the Late Tertiary stratigraphy of GSQ Sandy Cape 1-3R.
Investigation has begun on core samples from the Northern Great Barrier Reef Region and on surface samples from the Heron Island Reef area.

CO-ORDINATION WITH OTHER PROJECTS

This project is co-ordinated with projects undertaken by the School of Earth Sciences, Australian National University, the Australian Institute of Marine Sciences, the Department of Geology of the Universities of Queensland and James Cook University.

GEOGRAPHIC REGIONS: C,J,R,Q

MAJOR DESCRIPTORS: Foraminifera/Biostratification/Sediment analysis/Evolution/Benthos/

[QGS---002]

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

PERIOD: September 1984 -

ORGANIZATION: Geological Survey of Queensland
Chief Government Geologist,
GPO Box 194,
Brisbane, Qld 4001

PROJECT LEADER: Dr B.G. Fordham (07) 2244929

CONTACT OFFICER: Mr P.J.G. Fleming (07) 2244980

OBJECTIVE

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

METHODOLOGY

Shallow cores obtained from Dr G.R. Orme, Department of Geology and Mineralogy, University of Queensland, will be systematically sampled for microfossils. Representative subscripts will be quantitatively assessed for all mineral- walled microfossils in two fractions either side of 38 microns. Interpretation will rely on comparison with proportional abundances of biogenic components in present-day sediments.

CO-ORDINATION WITH OTHER PROJECTS

Sedimentologic research on these cores is being carried out under the direction of Dr. G.R. Orme, Department of Geology and Mineralogy, University of Queensland.

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Sediment analysis/Foraminifera/Palaeoceanography/Distribution patterns/

[QGS---007]

42 Geological investigations for coastal zone management.

ORGANIZATION: Geological Survey of Queensland
Chief Government Geologist,
GPO Box 194,
Brisbane, Qld 4001

PROJECT LEADER: Mr A.W. Stephens (02) 2244394

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 are 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, tranpsort 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 and Bowen regions.

CO-ORDINATION WITH OTHER PROJECTS

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

GEOGRAPHIC REGIONS: Q,R

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

[QGS---004]

43 Recruitment, dispersal, and distribution of living sedimentary foraminifers on selected sites of the Great Barrier Reef area.

PERIOD: December 1983 -

ORGANIZATIONS: Geological Survey of Queensland
Chief Government Geologist,
P.O. Box 194,
Brisbane, Qld 4001

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

PROJECT LEADERS: Dr V. Palmieri (07) 2244166/2244929
Dr J.S. Jell (07) 3772677

CONTACT OFFICER: Mr P.J.G. Fleming (07) 2244980

EXPENDITURE: $2,800 (this year)

MANPOWER: 0.06 (this year)

EXTERNAL SUPPORT: MSTGS - $4,500

OBJECTIVE

To investigate the recruitment of sedimentary foraminifers on biofouling plates in preselected sites of the Great Barrier 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 predetermined period of time on biofouling plates positioned along transects of reefs.

STATUS

The first experimental plates placed in December 1983 and retrieved in May 1984 from a pool on the leeward edge of Heron Island reef have shown successful recruitment of foraminifera. Seven stations carrying 49 plates were placed along a north-south transect of the Heron Island Reef and will be retrieved before the end of 1984.

LOCALITY: Heron Island

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Foraminifera/Sediment sampling/Distribution patterns/

[QGS---006]

44 Seismic stratigraphy of Queensland continental shelf.

PERIOD: January 1978 -

ORGANIZATION: Geological Survey of Queensland
Chief Government Geologist,
GPO Box 194,
Brisbane, Qld 4001

PROJECT LEADER: Mr A.W. Stephens (07) 2244394

OBJECTIVE

To investigate the Quaternary history of selected areas of the continental shelf.

METHODOLOGY

Continuous seismic profiling in co-ordination with investigations of available bottom sediment and corehole samples.

STATUS

In areas of the Central Great Barrier Reef the pre-Holocene surface has been delineated and the Postglacial sediment distribution investigated.

CO-ORDINATION WITH OTHER PROJECTS

This project is co-ordinated with some projects underway at the Departments of Geology and Geography, James Cook University of North Queensland.

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Quaternary period/Geological history/Continental shelf/Seismic data/Stratigraphy/

[QGS---003]

45 **Analysis of Soils from Coral Islands in the Capricornia Section of the Great Barrier Reef Marine Park.**

PERIOD: January 1984 - December 1984

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

Capricornia Institute of Advanced Education (Subcontract)
Department of Chemistry,
Rockhampton, Qld 4700

PROJECT LEADERS: Dr W. Craik (077) 818811
Dr G. Pegg (079) 361177
Dr J. Hughes (079) 361177

CONTACT OFFICER: Ms E. Eager (077) 818811

EXPENDITURE: $900 (this year), $900 (all years)

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

EXTERNAL SUPPORT: Queensland Co-ordinator General, Premier's Department - $900

OBJECTIVE

To determine important physical and chemical properties of soils and to relate these findings to papameters such as location, depth, human usage, flora and fauna populations and possibly effluent disposal.

METHODOLOGY

Soil samples will be analysed for pH, conductivity and concentrations of: chloride, sodium, potassium, magnesium, calcium, iron, copper, nitrate, nitrite, phosphate and total organic material.

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.

LOCALITY: Great Barrier Reef Marine Park - Capricornia Section

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Coral reefs/Soil analysis/Islands/Environmental impact/

[GBRMPA106]

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

PERIOD: August 1983 - December 1985

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

University of Queensland
Dept. Civil Engineering,
St. Lucia, Qld 4067

PROJECT LEADERS: Dr W. Craik (077) 818811
Dr M.R. Gourlay (077) 3771111

CONTACT OFFICER: Dr W. Craik

EXPENDITURE: $1,500 (this year), $5,000 (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
Literature search in progress, field work complete.

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Coral reefs/Cays/Geomorphology/

[GBRMPA081]

47 Comparative Structure and Growth of Windward and Leeward Fringing Reefs on Orpheus Island, North Queensland.

PERIOD: February 1984 - December 1984

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

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

PROJECT LEADERS: Dr W. Craik (077) 818811
Mr R. Barnes (077) 814111 (JCU)

CONTACT OFFICER: Ms E. Eager (077) 818811

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

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

OBJECTIVE
To examine the structure of a windward fringing reef (Iris Point, Orpheus Island) and compare it with previously drilled leeward reefs of Orpheus and Fantome Islands.

METHODOLOGY
Cores will be drilled from Iris Point Reef for radiocarbon dating and laboratory work which will include: (i) careful logging, including evidence of bioerosion;(ii) aragonite and calcite analysis;(iii) Sr:Ca ratios; and (iv) determination of non carbonate content as an indicator of terrigenous influence.
Surface mapping of the reef will be carried out.

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.

LOCALITY: Orpheus Island

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Reefs/Growth/Core analysis/Reef formation/

[GBRMPA105]

48 **Geomorphological information on the Continental Shelf, coral reefs and coastline from Fitzroy to Gould Island.**

PERIOD: January 1983 -

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 (077) 814111

CONTACT OFFICER: Ms E. Eager (077) 818811

EXPENDITURE: $900 (all years)

MANPOWER: 1.00 (this year), 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

Field work continued in 1984.

GEOGRAPHIC REGION: R

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

[GBRMPA056]

49 **Geomorphology, Zonation and Sediments of Sanctuary Reef, Swain Reefs Area, Southern Great Barrier Reef.**

PERIOD: January 1984 - December 1984

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

University of New England (Subcontract)
Department of Geology and Geophysics,
Armidale, N.S.W. 2351

PROJECT LEADERS: Dr W. Craik (077) 818811
Mr S. Reed (067) 733333

CONTACT OFFICER: Ms E. Eager (077) 818811

EXPENDITURE: $800 (this year), $800 (all years)

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

OBJECTIVE

To produce a map of the geomorphology of Sanctuary Reef. To describe the morphological zonation across several transects. To determine factors influencing sedimentation.

METHODOLOGY

Methods will include aerial photograph interpretation and ground survey to prepare a base map, collection and analysis of sediment samples, comparison of zonation of sediment parameters with the morphological zonation.

STATUS

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

LOCALITIES: Sanctuary Reef; Swain Reefs

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Geomorphology/Sedimentation/Reefs/

[GBRMPA107]

50 Modern Sediment Disposal at the Burdekin River Mouth.

PERIOD: June 1984 - October 1985

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

James Cook University of North Queensland
Department of Geology,
Post Office,
Townsville, Qld 4811

PROJECT LEADERS: Dr W. Craik (077) 818811
Prof R.M. Carter (077) 814111
Dr D.P. Johnson (077) 814111

CONTACT OFFICER: Mr I.M. Dutton (077) 818811

EXPENDITURE: $3,330 (this year)

MANPOWER: 0.40 (this year), 1.20 (all years)

OBJECTIVES

To undertake a pilot study to investigate the patterns of sediment distribution and dispersal into the inner shelf of the Burdekin River Mouth, with emphasis on:
1. Locations of maximum sediment accumulations since 6.5 ky;
2. Volumetric estimate of the shelf sediment wedge;
3. Establishing the seawards extent of the wedge, particularly with respect to the 18-20m sediment "fence" and
4. Establishing a sedimentary baseline against which post-clam effects can be measured.

METHODOLOGY

Standard techniques of low-frequency seismic profiling, grab sampling, coring and laboratory study to be employed.

STATUS

Field work in progress. Honours project based on analysis of data collected to begin in 1985.

LOCALITY: Burdekin River

GEOGRAPHIC REGION: R

SHIP TIME REQUIREMENTS: 7 days

MAJOR DESCRIPTORS: Sediment distribution/River discharge/

[GBRMPA097]

51 Role of *Acanthaster* in Reef Degradational Processes.

PERIOD: May 1984 - December 1984

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

James Cook University of North Queensland
Department of Geology,
Post Office,
Townsville, Qld. 4811

PROJECT LEADERS: Dr W. Craik (077) 818811
Dr R. Henderson (077) 814111

CONTACT OFFICER: Mr I.M. Dutton (077) 818811

EXPENDITURE: $3,040 (this year), $3,040 (all years)

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

OBJECTIVE

To produce an atlas documenting the morphology of *A. planci* skeletal elements. To compile records of *A. planci* infestations in the GBR from skeletal elements in samples. To plan in detail a schedule and techniques for site investigation, monitoring and core sampling relevant to this sphere of investigation.

METHODOLOGY

Skeletal elements of *A. planci* are to be documented using a Scanning Electron Microscope. Concurrently, a literature review will be undertaken and records of *A. planci* infestations collated. A more comprehensive study program will be developed based on the results of this pilot phase.

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: *Acanthaster planci* /Geological surveys/Coral reefs/Morphology (organisms)/

[GBRMPA096]

52 Sedimentation between the Herbert Delta and Orpheus Island.

PERIOD: January 1981 -

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

James Cook University of North Queensland
Post Office
Townsville, Qld 4811

PROJECT LEADERS: Dr W. Craik (077) 818811
Dr D.P. Johnson (077) 814111

CONTACT OFFICER: Dr W. Craik

EXPENDITURE: $5,000 (all years)

MANPOWER: 0.13 (this year)

OBJECTIVES

1. To detail terrigenous carbonate transition between Herbert Delta and fringing reefs and Orpheus Island.
2. To quantify sediment inputs to reefs.
3. To investigate geochemical record in coral skeletons.

METHODOLOGY

Detailed mapping of the sediments between the Delta and the reef will be undertaken, involving analysis in terms of size, biota, clay mineralogy and geochemistry.
Sediment traps will be placed on the reef to gauge wet and dry season sediment inputs.
Sediments and skeletons will be collected for clay mineralogy and geochemical analysis particularly for metals which could be expected to come from the Herbert River e.g. Sn, Mo, Cu, Zn, from alluvial tin mining and fertilizer trace elements.

STATUS

Field work has been completed. Report to be completed and submitted to GBRMPA.

LOCALITIES: Herbert River; Orpheus Island

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Sedimentation/Coral reefs/River discharge/Geochemistry/

[GBRMPA036]

53 Stability of Coral Cays in the Capicornia Section of the Great Barrier Reef Marine Park.

PERIOD: June 1984 - February 1985

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

University of New England
Department of Geology,
Armidale, N.S.W. 2351

PROJECT LEADERS: Dr W. Craik (077) 818811
Dr P. Flood (067) 733333

CONTACT OFFICER: Mr I.M. Dutton (077) 818811

EXPENDITURE: $5,000 (this year)

MANPOWER: 0.20 (this year), 0.30 (all years)

OBJECTIVE

To install permanent survey marks on five islands within the Capricorn Group (Heron, Wilson, Erskine, Tryon and North) in order to monitor changes in shoreline configuration over time. The survey works to be calibrated with earlier survey work by the researcher. Supplement any training of QNPWS staff in cay stability survey and monitoring.

METHODOLOGY

Temporary survey marks placed during ARGS project E75/15019 be replaced by permanent survey marks. Field training of QNPWS staff in cay stability survey techniques.

STATUS

Field work complete. Preparation of report underway.

LOCALITIES: Great Barrier Reef Marine Park - Capricornia Section; Heron Island; Erskine Island; Tryon Island

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Cays/Stability/Coral reefs/

[GBRMPA095]

54 **Stratigraphy of lagoon sediments - Lady Musgrave Island.**

PERIOD: June 1984 - July 1985

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

University of Sydney
Department of Geology and Geophysics,
Sydney, N.S.W. 2006

PROJECT LEADERS: Dr W. Craik (077) 818811
Assoc Prof C.V.G. Phipps (02) 6922924

CONTACT OFFICER: Mr I.M. Dutton (077) 818811

EXPENDITURE: $2,700 (this year), $3,000 (all years)

MANPOWER: 0.10 (this year), 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.

STATUS

Field work in progress.

LOCALITY: Lady Musgrave Island

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Sedimentation/Lagoons/Stratigraphy/Reefs/

[GBRMPA094]

55 **Circulation and sediment movement on and around north Queensland bayhead fringing reefs, with special reference to the effect of resort development.**

PERIOD: May 1982 - December 1985

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

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

PROJECT LEADERS: Assoc. Prof. D. Hopley (077) 814571
Mr K. Parnell (077) 814831

CONTACT OFFICER: Mr K. Parnell

EXPENDITURE: $8,000 (this year), $25,000 (all years)

MANPOWER: 1.20 (this year), 4.50 (all years)

OBJECTIVE

To study aims to determine the dynamics of bayhead fringing reefs, with special reference to the situation of resort development in these environments. A model for determining the likely effects of the introduction of a contaminant to a bay, with minimal field calibration will be produced. This will be of considerable use for the management of present resorts, and in determining likely effects and means of avoiding water quality and other problems at potential resort sites.

METHODOLOGY

Collection of oceanographic type data, both Eulerian and Lagrangian, for water movement study, using Braystoke current meters and fluorometric methods. Determination of nutrient and sediment (susp). concentrations in water together with water movement data will enable a model to be produced for Orpheus Island, Pioneer Bay (primary research site), with calibration at other sites.

STATUS

Data collection for initial modelling is almost complete. Model development is in progress. Initial investigation of sites to be used for calibration of the model is underway.

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Sediment transport/Water circulation/Tourism and environment/Water quality/

[JAMESC069]

56* Sr/Ca ratios in corals as an indicator of palaeotemperature.

PERIOD: March 1983 - December 1985

ORGANIZATIONS: James Cook University of North Queensland
Geography Dept.
P.O. Townsville, Qld 4811

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

PROJECT LEADERS: Mr A. Slocombe
Prof. D. Hopley (077) 814571

CONTACT OFFICER: Mr F. Muir (077) 814831

EXPENDITURE: $1,000 (this year)

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

OBJECTIVE

To determine the use of Sr/Ca ratios in modern and ancient corals as an indicator of palaeotemperature. A study of species variation will also be made, to determine the use of Sr/Ca ratios for different species. The study should enable the construction of a model which can be used to determine palaeotemperature - thus indicating changes of environment, and enabling prediction of the influence of future environmental changes on reef growth.

METHODOLOGY

Modern corals from the Great Barrier Reef, and core samples will be analysed for Sr:Ca using electron microscopy. Coral samples will also be x-radiographed to determine growth rings, thus facilitating more accurate pin-pointing of samples.

STATUS

Samples and cores have been collected and x-radiographed.

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Palaeotemperatures/Coral reefs/Growth/Geological history/Core analysis/

[JAMESC067]

57 The suitability of using strontium levels, as recorded in corals at precipitation, for sea-water temperatures interpretation.

PERIOD: May 1982 - August 1983

ORGANIZATIONS: James Cook University of North Queensland
Geography Department,
Post Office,
J.C.U.N.G.
Townsville, Qld 4811

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

PROJECT LEADERS: Mr F. Muir (071) 497762
Assoc Prof D. Hopley (077) 814571

CONTACT OFFICER: Assoc Prof D. Hopley

EXPENDITURE: $2,695 (all years)

MANPOWER: 0.75 (all years)

OBJECTIVE

To predict, using strontium levels, from present-day and Holocene corals the annual and seasonal sea-water temperatures at the time of coral growth. Designed to provide an indication of environmental factors influencing coral growth in the Holocene. Temporal variations may be explained by changing climatic and oceanographic factors. Differences between nearshore fringing reef corals and offshore reef corals may be evident.

METHODOLOGY

Corals were collected from present-day living reefs to establish modern thermometry standards against which the corals from submerged Holocene reefs can be compared. Geochemical analysis and sclerochronology of the modern and fossil cores was undertaken. Geochemical analysis involved electron microprobe, atomic absorption and XRF techniques. The ratios provided were related to the density banding and C14 dates.

STATUS

The results from the analysis showed that there were no variation in the strontium content between and across the coral density bands, the levels being in the order of 7400 ± 50 ppm strontium. There was also no variation in the Sr content for corals from various localities and time periods. The Sr level reflected only the present mean annual sea-water temperature. The findings are in contrast to recent Hawaiian results suggesting that the strontium levels cannot be used as a means to determine seasonal temperature variations in all coral reef environments. The strontium thermometer appears to work best where few external influences are operating on the reef environment. Possible factors affecting the coral growth kinetics that also affect the uptake of strontium could be the influx of periodic water masses from nearshore rivers and/or inputs of trace chemical components into the reef environment. This hypothesis could be tested by studying corals sampled from nearshore reefs, known to be affected by the above factors, and comparing them to far off-shore reef corals.

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: 7 days

MAJOR DESCRIPTORS: Water temperature/Predictions/Strontium/Corals/Holocene epoch/

[JAMESC064]

58* Ostracoda : Banks Strait, South Pacific.

ORGANIZATION: Riverina College of Advanced Education
School of Applied Science
P.O. Box 588
Wagga Wagga, N.S.W. 2650

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

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

EXPENDITURE: $2,040 (this year), $2,040 (all years)

MANPOWER: 0.12 (this year), 0.12 (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.
Lizard Island - material picked, retained in alcohol.
Flinders Island littorals sampled.
Campbell Island sampled and picked; types selected. 1 publication.
Flinders Island littorals sampled.
Campbell Island sampled and picked; types selected. 1 publication.

LOCALITY: Lizard Island

GEOGRAPHIC REGIONS: B,R,P

MAJOR DESCRIPTORS: Ostracoda/Taxonomy/Biostratigraphy/

[RCAE--003]

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

PERIOD: January 1981 -

ORGANIZATION: University of New South Wales
School of Applied Geology
P.O. Box 1
Kensington, N.S.W. 2033

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

MANPOWER: 0.02 (this year)

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.

STATUS

The project is in a comparatively early stage of development.

GEOGRAPHIC REGIONS: R,Q,N

MAJOR DESCRIPTORS: Foraminifera/Biostratigraphy/Palaeoceanography/Sediment sampling/

[UNINSW009]

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

PERIOD: September 1980 - June 1985

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

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

EXPENDITURE: $4,363 (this year), $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 are 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 is available for two beach materials of known properties from a previous research program. The present program involves further experiments with two more beach materials and a different wave period.
Experimental data from the previous research program has been analysed and the initial results presented in report form. The two series of beach profile tests at two different wave periods have been completed using fine beach pebbles. Basic analysis of the results from the pebble tests has been completed. The experimental work for the final test series with a medium size sand is now 80% complete. It is expected that the results of the project will be reported by June 1985.

LOCALITY: Heron Island

GEOGRAPHIC REGIONS: R,X

MAJOR DESCRIPTORS: Beaches/Beach accretion/Surf zone/Sediment transport/Hydrodynamics/

[UNIQLD008]

61 Impact of coastal engineering works upon coral cays.

PERIOD: January 1979 -

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.
Analysis of wind data is currently in progress. Preliminary results indicate that there are significant annual movements of the dominant south east winds which shape the cay. Moreover infrequent strong winds from the north west may also be very significant in causing beach erosion.

LOCALITY: Heron Island

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Cays/Construction/Dredging/Environmental impact/Erosion/

[UNIQLD007]

62* **Interuniversity investigation of sedimentation, water movement and evolution and maintenance of shelf features in northern Great Barrier Reef Province.**

PERIOD: October 1980 - December 1985

ORGANIZATIONS: University of Queensland
Dept. Geology and Mineralogy
St. Lucia, Qld 4067

University of Adelaide
CSR Limited
Coal Division
G.P.O. Box 483
Sydney, N.S.W. 2001

University of Melbourne
Parkville, Vic. 3053

PROJECT LEADERS: Dr G.R. Orme
Dr J.R. Hails (02) 2358178 (CSR)

CONTACT OFFICER: Dr G.R. Orme

EXPENDITURE: $549,995 (all years)

EXTERNAL SUPPORT: MST - $100,000

OBJECTIVE

The aims of this project are to achieve an understanding of present sedimentation and water circulation patterns in a section of the Great Barrier Reef Province through the acquisition of quantitative information regarding water movements and sediment dispersal, and to determine from the stratigraphic record, the sequence of events that led to the establishment of present shelf characteristics.

METHODOLOGY

The project comprises two principle interrelated parts, viz that concerned with the "solid geology" and that concerned with present sediment transport/water movement. High resolution geophysical profiling methods and vibrocoring techniques are used to determine sedimentary facies, internal sedimentary structures, relict features and shallow sub bottom structure. Palaeotemperature and age determinations are carried out on vibrocore samples. Side-scan- sonar is used to help map the distribution of present sea bed features. Sedisystem tripods, current metres, tide gauges, sea bed drifters, and sediment flux monitoring equipment are employed for the sediment transport studies.

STATUS

The 'solid geology' phase is nearing completion. Vibrocoring of the shelf and shore line studies were carried out in November 1981 and 1982 and have been completed. Specific areas have been intensively studied by seismic profiling methods, work on specific targets still has to be carried out to complete this aspect of the project. September monitoring of sediment transport/water movements has begun.

GEOGRAPHIC REGION: R

SHIP TIME REQUIREMENTS: 50 days 07/82-06/83

MAJOR DESCRIPTORS: Ocean circulation/Sediment transport/Shelf dynamics/

[UNIQLD032]

See: 26, 149, 150

63 **Bacterial Populations in the mucus of stressed and non-stressed Staghorn coral *Acropora* spp.**

PERIOD: May 1983 -

ORGANIZATION: La Trobe University
Microbiology Department,
Bundoora, Vic 3083

PROJECT LEADERS: Prof J.S. Waid (03) 4792229
Ms A. Duncan

CONTACT OFFICER: Prof J.S. Waid

EXPENDITURE: $22,000 (this year), $25,000 (all years)

MANPOWER: 1.00 (this year), 2.00 (all years)

EXTERNAL SUPPORT: GBRMPA - $1,540 (Covering travel grants for field work 1983 and 1984.)
MSTGS - $9,000

OBJECTIVE

To examine bacterial populations growing in mucus of healthy corals and to assess any changes that may occur in these populations if the coral is stressed.

METHODOLOGY

Coral samples were maintained in tanks of flowing seawater which was supplemented with one of the following, nutrient, freshwater, pesticide, oil, or oil and emulsifier. Control samples were maintained in flowing seawater without supplements. Samples were withdrawn periodically and bacteria present in mucus cultured, counted and characterised. Populations present were compared to populations present on samples collected from the field and processed immediately.

STATUS

Bacterial populations have been identified which may be indicative of coral stress. Return of samples to shore and maintenance in tanks causes some stress-related changes in bacterial populations. This illustrates the necessity of carrying out this type of work *in situ* , whenever possible. Work is underway to develop monoclonal antibodies to a bacterial indicator of coral stress. Monoclonal antibodies will enable more rapid detection of the bacteria.

CO-ORDINATION WITH OTHER PROJECTS

Part of this work was carried out during the MECOR meeting in August 1984.

GEOGRAPHIC REGION: R

SHIP TIME REQUIREMENTS: 4 days during MECOR.

MAJOR DESCRIPTORS: *Acropora* /*Anthozoa* /Coral stress/Bacteria/Pollution effects/

[LATROB009]

See also: 134*, 137

64 **The productivity and bioaccumulation of trace elements by blue-green algae of the Great Barrier Reef.**

PERIOD: January 1983 - December 1983

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

University of Melbourne (Subcontract)
Parkville, Vic. 3052

PROJECT LEADERS: Dr W. Craik (077) 818811
Mr J. Jones (03) 3451844

CONTACT OFFICER: Dr W. Craik

EXPENDITURE: $900 (all years)

MANPOWER: 1.00 (all years)

OBJECTIVE

To determine the productivity of blue-green algal mats and the importance of this productivity to the reef ecosystem. To determine the elemental composition of the blue-green algae and organisms higher in the food chain to determine if trace elements are accumulated.

METHODOLOGY

Productivity to be determined by ^{14}C uptake and biomass estimates. Elemental analysis to be undertaken by energy dispersive XRF spectrometry.

STATUS

Report submitted to 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.

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Algae/Trace elements/Bioaccumulation/Production (biological)/Ecosystems/

[GBRMPA058]

65* **Biology and ecology of boring organisms in coral reefs.**

PERIOD: March 1983 - March 1987

ORGANIZATIONS: James Cook University of North Queensland
Botany Department
Post Office
Townsville, Qld 4811

Australian Institute of Marine Science
P.M.B. 3
M.S.O.
Townsville, Qld 4810

PROJECT LEADERS: Mr J. Chisolm (077) 814853
Dr I.R. Price (077) 814133
Dr C.R. Wilkinson (077) 789372

CONTACT OFFICER: Mr J. Chisolm

EXPENDITURE: $1,300 (this year)

MANPOWER: 1.10 (this year)

OBJECTIVE

To investigate the distribution of boring organisms in coral reefs and the factors controlling their distribution and boring activities.

STATUS

Project presently being initiated.

GEOGRAPHIC REGION: R

SHIP TIME REQUIREMENTS: 10 Days

MAJOR DESCRIPTORS: Boring organisms/Algae/Coral reefs/Distribution/

[JAMESC063]

66* **Photoadaptation in marine algae.**

PERIOD: January 1982 -

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

PROJECT LEADER: Dr T. Luong-Van (077) 814466

EXPENDITURE: $7,500 (this year), $8,650 (all years)

MANPOWER: 0.10 (this year), 0.20 (all years)

OBJECTIVE

To investigate the effects of light quality and quantity on the physiology and ultrastructure of marine phytoplankton and multicellular algae. In particular it is proposed to study the time course of changes in the photosynthetic machinery when the algae are shifted from one light condition to another.

METHODOLOGY

Methods used:
1. $14CO_2$ photosynthetic fixation, including chemical fractionation of the photosynthetic products.
2. Scanning and transmission electron microscopy.
3. Photosynthetic pigment extraction and separation.

STATUS

The work carried out so far has dealt with the effect of different white light intensities on the growth, photosynthetic pigment and photosynthetic characteristics of a marine species of crytomonad, *Cryptomonas* Lis. It was established that this species of *Cryptomonas* can grow under a wide range of irradiance from 4μE in $^{-2}sec^{-1}$ to 260μE m $^{-2}sec^{-1}$. Under low irradiance (i.e. below 100μE m $^{-2}sec^{-1}$), the cells contained more photosynthetic pigment, especially phycoerythrin, than those grown under high irradiance.
It is proposed to study a range of unicellular algae isolated from coastal waters in the vicinity of Townsville. The effects of marine algae irradiance (matching that available at different depths in the water column) upon the photosynthetic machinery of photoadaptable algae will be investigated.

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Algae/Photosynthesis/Light penetration/

[JAMESC055]

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67 The genus *Sonneratia* (Sonneratiaceae) in Australia

PERIOD: January 1979 - December 1984

ORGANIZATIONS: James Cook University of North Queensland
Post Office
Townsville, Qld 4811

Australian Institute of Marine Science

PROJECT LEADERS: Dr B.R. Jackes (077) 814574 (James Cook University)
Mr N.C. Duke (077) 789373 (Australian Institute of Marine Science)

CONTACT OFFICER: Dr B.R. Jackes

OBJECTIVE

To understand the mangrove genus *Sonneratia* in Australia.

METHODOLOGY

1. Collection and distribution of material including comparison with New Guinea material. 2. Litter studies. 3. Phenology. 4. Taxonomy. 5. Cytology. 6. Anatomical Studies light and electron microscopy. 7. Numerical analysis.

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: E,Y,C,J,R

MAJOR DESCRIPTORS: *Sonneratia* /Angiospermae/Taxonomy/Physiology/Morphology (Organisms)/

[JAMESC008]

68 The role of crustose coralline algae in coral reef ecosystems with special reference to their contribution to primary production and calcification.

PERIOD: September 1983 - December 1986

ORGANIZATIONS: James Cook University of North Queensland
Department of Botany,
Post Office,
James Cook University,
Douglas, Qld 4811

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

PROJECT LEADERS: Mr J.R.M. Chisholm (077) 814853
Dr I.R. Price (077) 814133
Dr B.E. Chalker (077) 789275 (AIMS)

CONTACT OFFICER: Mr J.R.M. Chisholm

EXPENDITURE: $7,266 (this year), $7,266 (all years)

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

EXTERNAL SUPPORT: Lizard Island Research Station Doctoral Fellowship - $4,000 (For payment of bench fees and travel)
Commonwealth Department of Education - $1,000 (For travel only)

OBJECTIVE

To establish models for photosynthesis and calcification in selected species of crustose coralline algae. These models will be used in combination with data from field analyses of distribution and percentage cover to provide estimations of gross productivity and calcification in specific assemblages of these organisms.

METHODOLOGY

1. Photosynthesis. Light-response curves for photosynthesis are being prepared on the basis of oxygen production under varied, natural (in the field) and artificial (in the laboratory) illumination.
2. Calcification. Calcification rates are being determined from calcium-45 incorporation under simulated conditions in the laboratory, and by pH changes measured using a pH electrode and alkalinity titrations in the field.
3. Growth. Long-term growth rates, for comparative purposes, are being measured at six-monthly intervals by linear extension rates and increases in crust thickness.
4. Distribution and abundance. Data on distribution and percentage cover is being derived from field surveys using line-transect and quadrat methods.

STATUS

The project has involved the preparation of light saturation curves for photosynthesis, measurement of calcification rates using calcium-45 radioisotope, and the establishment of long-term growth trials.
Future studies will involve field measurements of primary production and calcification, measurements of long-term accretion rates, and surveys of distribution and abundance.

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Algae/Ecosystems/Primary production/Calcification/Photosynthesis/

[JAMESC074]

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69 **Mangroves of Trinity Inlet, Cairns.**

PERIOD: - December 1984

ORGANIZATION: Queensland Department of Primary Industries
Division of Dairying and Fisheries abd Botany Branch,
Meiers Road,
Indooroopilly, Qld 4068

PROJECT LEADERS: Mr H.F. Olsen (07) 2276425
Mr R. Dowling (07) 3779318

CONTACT OFFICER: Mr R. Dowling

OBJECTIVE

To map the mangrove (intertidal) vegetation of Trinity Inlet Carins.

METHODOLOGY

Mapping of vegetation is undertaken by interpretation of aerial photographs and ground truth surveys. A vegetation map and report is then prepared.

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.

LOCALITY: Trinity Inlet

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Mangrove swamps/Angiospermae/Aerial photography/

[QDPI--012]

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

PERIOD: June 1979 - December 1986

ORGANIZATIONS: University of New South Wales
School of Botany
P.O. Box 1
Kensington, N.S.W. 2033

University of Sydney
School of Biological Sciences
Sydney, N.S.W. 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: $2,000 (this year), $3,000 (all years)

MANPOWER: 0.30 (this year), 0.50 (all years)

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

Preliminary investigations of anatomy of *Pisonia grandis* and of nutrient input from birds, have been completed and published. Further studies on this species are under way; including comparison with material from Seychelles, electron microscopy, culturing and nutritional physiology.

LOCALITY: Capricorn Group

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Cays/*Pisonia grandis* /Angiospermae/Nutrient cycles/Mycorrhiza/

[UNINSW013]

71 Salt and water relations of higher plants of islands of the Great Barrier Reef.

PERIOD: September 1977 - December 1984

ORGANIZATION: University of Sydney
School of Biological Sciences
Sydney, N.S.W. 2006

PROJECT LEADER: Dr W.G. Allaway (02) 6922280

OBJECTIVE

To investigate the salt and water-balance physiology of the higher plant species peculiar to coral cays (in particular, One Tree Island and Heron Island, Capricorn Group) in order to establish how these species cope with the problems of high isolation and evaporation in an environment of potentially high salinity and sporadic water supply.

METHODOLOGY

Description of plant-water relationships on the Islands: daily march of water potential, stomatal behaviour, xylem sap-flow. Relationship between sap flow and small shoot water potential. Analysis of soil water and salt levels, plant water and solute content.
Methods used: diffusion porometry, Scholander pressure-chamber, thermocouple psychrometry, heat pulse xylem flow meter. Analysis: flame and atomic absorption spectrophotometry, chloride titrator. CHN analyser.

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.

LOCALITIES: One Tree Island; Heron Island

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Angiospermae/Physiology/Salinity effects/Cays/Water balance/

[UNISYD020]

See also: 116

72 Systematics and Ecology of Phytobenthos of Swain Reefs.

PERIOD: January 1981 -

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

Saenger, Dr P.
92 Newman Avenue
Camp Hill, Qld 4152

PROJECT LEADERS: Dr W. Craik (077) 818811
Dr P. Saenger

CONTACT OFFICER: Dr W. Craik

EXPENDITURE: $1,057 (all years)

MANPOWER: 0.10 (this year)

OBJECTIVE

To document phytobenthos of Swain Reefs. To observe functional role of phytobenthos in a southern reef ecosystem.

METHODOLOGY

Systematic collecting at various depths, habitats, to complete taxonomic studies. Quantitative studies on the phytobenthos will be carried out using SCUBA.
Marked study sites will be revisited at various intervals to determine seasonal and long-term changes in species composition, standing crop growth rates and reproductive development.

STATUS

Field work has been completed. Report to be completed and submitted to GBRMPA.

CO-ORDINATION WITH OTHER PROJECTS

A.B. Cribb. Algal flora in the Capricorn Bunker Groups.

LOCALITY: Swain Reefs

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Phytobenthos/Check lists/Taxonomy/Life history/Population dynamics/

[GBRMPA027]

73 Systematic survey of the turf algal flora of coral reefs in NE Queensland.

PERIOD: January 1980 - June 1985

ORGANIZATION: James Cook University of North Queensland
Department of Botany,
Post Office,
James Cook University,
Douglas, Queensland 4811

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

EXPENDITURE: $25,698 (this year)

MANPOWER: 1.25 (this year), 2.75 (all years)

EXTERNAL SUPPORT: MSTGS - $25,698

OBJECTIVE

An understanding of the systematics and distribution of the turf-forming algae on coral reefs in North Queensland.

METHODOLOGY

Different habitats on different reef types in different geographical areas have been sampled at different seasons. Data on morphology, reproduction, phenology, and habitat is being collated for inclusion in systematic handbook.

STATUS

The field sampling is completed, and detailed analysis of the samples and collation of data is proceeding.

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Algae/Taxonomy/Check lists/Geographical distribution/Coral reefs/

[JAMESC007]

74 Systematics and ecology of tropical Australian marine macroalgae.

PERIOD: January 1968 -

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

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

MANPOWER: 0.10 (this year), 2.85 (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: Benthic environment/Tropical zones/Algae/Taxonomy/Ecology/

[JAMESC050]

75 Taxonomic studies of benthic marine algae.

PERIOD: January 1973 -

ORGANIZATION: Murdoch University
Environmental and Life Sciences
Murdoch, W.A. 6150

PROJECT LEADER: Dr M.A. Borowitzka (09) 3322333

MANPOWER: 0.15 (this year), 2.50 (all years)

OBJECTIVE

To improve our understanding of the systematics and taxonomy of a range of benthic marine algae, especially the Corallinaceae and the Caulerpales.

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).

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/Corallinaceae/Caulerpales/

[MURUNI013]

76* Taxonomy, distribution and phylogeny of marine algae from eastern Australian islands and the Great Barrier Reef.

PERIOD: April 1980 -

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

PROJECT LEADERS: Dr G.T. Kraft (03) 3416855
Dr R. Wetherbee

CONTACT OFFICER: Dr G.T. Kraft

EXPENDITURE: $15,190 (this year), $32,803 (all years)

MANPOWER: 1.25 (this year), 2.00 (all years)

EXTERNAL SUPPORT: AMSTAC-FAP - $63,214 (1980/1 17613, 1981/2 20100, 1982/3 25501)

OBJECTIVES

1. To document the algal floras of selected coral reefs and adjacent areas in eastern Australia, particularly the Great Barrier Reef and at latitudes on mainland Australia at comparable latitudes to Lord Howe Island. The work concentrates on subtidal algae down to 40 m depth.
2. To study biogeographical relationships of Great Barrier Reef flora to the floras of New South Wales and Lord Howe Island to the south, and to tropical Pacific to the north.

METHODOLOGY

Collections are mostly by SCUBA; material is prepared as herbarium vouchers and microscope slides; selected species are fixed for electron microscopy in the field for critical examination of subcellular systems; anatomical observations are backed up by drawings, photographs, micrographs etc. for incorporation into monographs of particular genera or groups.

STATUS

Several monographs of GBR genera have been completed; an illustrated flora of subtidal algae from the Capricorn Group is in preparation; the floras of Coffs Harbour and the Solitary Islands are being compiled.

LOCALITIES: Coffs Harbour; Solitary Islands; Capricorn Group

GEOGRAPHIC REGIONS: R,Q,N

[UNIMEL042]

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

PERIOD: January 1965 - December 1984

ORGANIZATION: University of Queensland
Department of Botany
St. Lucia, Qld 4067

PROJECT LEADER: Dr A.B. Cribb (07) 3772728

EXPENDITURE: $800 (this year), $9,000 (all years)

MANPOWER: 0.65 (this year), 2.00 (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

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: Algae/Taxonomy/Ecology/Check lists/

[UNIQLD004]

See: 67, 164*

78 **Biological basis for managing population of dugongs and other marine mammals in Northern Australia (pilot study).**

PERIOD: November 1983 -

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

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

PROJECT LEADERS: Dr W. Craik (077) 818811
Dr H.D. Marsh (077) 814242

CONTACT OFFICER: Dr H.D. Marsh

EXPENDITURE: $37,275 (this year), $37,275 (all years)

MANPOWER: 0.75 (this year), 0.75 (all years)

OBJECTIVES

To develop an effective regime for monitoring dugong population in Northern Australia.
To obtain management relevant information on dugongs.
To co-ordinate 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.

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: *Dugong dugon* /Sirenia/Population dynamics/

[GBRMPA084]

79 **Functional Morphology and Nutrition of the Dugong in relation to its seagrass diet.**

PERIOD: January 1984 - December 1984

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

Monash University (Subcontract)
Department of Zoology,
Clayton, Vic 3168

PROJECT LEADERS: Dr W. Craik (077) 818811
Ms J. Lanyon (03) 5410811

CONTACT OFFICER: Ms E. Eager (077) 818811

EXPENDITURE: $750 (this year), $750 (all years)

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

OBJECTIVE

To investigate seagrasses at the community, morphological and ultra- structural levels in relation to the functional morphology of the dentition and digestive tract of the dugong.

METHODOLOGY

Laboratory investigation into the physical and chemical nature of seagrasses with respect to digestibility will be combined with studies of the mechanics of mastication by dugong and samples of ingested material from dugong.

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: *Dugong dugon* /Sirenia/Nutrition/Seagrass/

[GBRMPA109]

80 Feeding and breeding ecology of seabirds.

PERIOD: August 1973 -

ORGANIZATION: Griffith University
School of Australian Environmental Studies
Nathan, Qld 4111

PROJECT LEADERS: Dr K. Hulsman (07) 2757520
Dr N.P.E. Langham

CONTACT OFFICER: Dr K. Hulsman

EXPENDITURE: $13,900 (this year), $27,669 (all years)

MANPOWER: 0.52 (this year), 3.26 (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; Great Barrier Reef Marine Park - Capricornia Section

GEOGRAPHIC REGION: R

SHIP TIME REQUIREMENTS: 54

MAJOR DESCRIPTORS: Aves/Feeding behaviour/Reproductive behaviour/Biological surveys/Resource management/

[GRIFFI002]

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81 **A study of the macroparasites of the Cooktown Salmon, *Eleutheronema tetradactylum* .**

PERIOD: February 1983 - December 1983

ORGANIZATION: James Cook University of North Queensland
Department of Zoology
Post Office
Townsville, Qld 4811

PROJECT LEADERS: Mr B. Ingram (077) 814845
Dr N.E. Milward (077) 814193

CONTACT OFFICER: Dr N.E. Milward

EXPENDITURE: $150 (all years)

MANPOWER: 0.60 (all years)

OBJECTIVE

To identify the metazoan parasites found on and in *Eleutheronema tetradactylum* , from the north coast of Queensland. To investigate the effects of location, size and sex of the host on the incidence and intensity of infestation. To determine pathological effects and site-specificity of selected ecto- and endoparasites.

METHODOLOGY

Samples of *E. tetradactylum* are being obtained from the Gulf of Carpentaria and Townsville district. Each fish is weighed, measured and sexed, then systematically examined both externally and internally for parasites. Each parasite found is identified, its location, incidence and intensity of infestation is recorded. Pathological effects are also investigated.

STATUS

Two monogenean, one digenean, two acanthocephalan, two cestode, four nematode and five copepod species identified. Variations in incidence and intensity have been observed.

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: *Eleutheronema tetradactylum* /Pisces/Parasites/

[JAMESC057]

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82 Aspects of the biology of anchovies (Teleostei : Engraulidae) in waters off Townsville.

PERIOD: February 1984 - December 1984

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

PROJECT LEADERS: Mr F. Hoedt (077) 814844
Dr N.E. Milward (077) 814193

CONTACT OFFICER: Dr N.E. Milward

EXPENDITURE: $200 (this year), $200 (all years)

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

OBJECTIVES

At least 9 members of this family of fishes can be found in the waters off Townsville. The taxonomic status of some of these species is unclear and very little work has been done on aspects of their life history and reproduction.
The project aims to uncover aspects of the growth, feeding and reproduction within this group. Descriptions of larval and adult fishes will be produced.

METHODOLOGY

Samples collected in inshore waters by beach seine nets and otter trawl (University Research Vessel 'James Kirby'). Stomach contents of fish examined each month and analysed using three accepted methods.
Growth rates are being elucidated by determination of 'daily growth patterns' in the otoliths which are ground, etched and examined using high power optical and scanning electron microscopy. These results are being compared with monthly length - frequency graphs.
Reproductive cycles are being monitored through the examination of the gonad condition of fish in monthly samples. Larval drawings and tabulations of adult taxonomic characteristics are included.

STATUS

The results have been written up for submissions in an Honours thesis.

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: Townsville

GEOGRAPHIC REGION: R

SHIP TIME REQUIREMENTS: 10 days (combined with other research and teaching cruises)

MAJOR DESCRIPTORS: Teleostei/Life history/Reproduction (biological)/Taxonomy/

[JAMESC072]

83 Feeding structures, growth, and spat fall of scallops of the genus *Amusium* (Bivalvia: Pectinidae) in waters off Townsville.

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

PROJECT LEADERS: Mr B. Kettle (077) 814844
Dr N.E. Milward (077) 814193

CONTACT OFFICER: Dr N.E. Milward

EXPENDITURE: $200 (this year), $200 (all years)

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

EXTERNAL SUPPORT: Reef Link Pty. Ltd., Townsville (12 day trips to the reef, to enable spat collections to be made.)

OBJECTIVE

To determine particle size selection in feeding; to investigate the potential of shell characteristics for age and growth determinations; and to develop spat collecting techniques as a preliminary to recruitment studies.

METHODOLOGY

Size selection characteristics of the gill have been determined by photomicrography of sectioned gills and gut content examinations. Shell structure was investigated with a scanning electron microscope. Age is being determined from large samples of height distribution data, allowing comparison of structure and age of shells. Spat fall has been investigated using a number of artificial substrates, collector designs and materials, all at various depths.

STATUS

Gut particle sizes determined for both species, related to gill structure. No firm relationship between particular shell characteristics and age has been found. Spat stage detected in adult shell by S.E.M. Spat found on artificial collectors. Preferred designs, depths and materials becoming apparent. Results at write-up stage.

LOCALITY: Townsville

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Bivalvia/Feeding/Growth/

[JAMESC071]

84* **Investigation of the life cycle behaviour and temporal and spatial distribution of the box-jellyfish, *Chironex fleckeri* .**

PERIOD: July 1977 -

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

PROJECT LEADER: Dr R.F. Hartwick (077) 814272 or 814111

EXPENDITURE: $12,000 (this year), $68,000 (all years)

MANPOWER: 1.40 (this year), 7.00 (all years)

EXTERNAL SUPPORT: ARGS - $11,500
Private Donors

OBJECTIVES

1. To describe and to understand the biology of each of the developmental stages comprising the full life cycle of *Chironex* .
2. To determine the abundance and distribution in space and time of these life stages.
3. To plot the movements of local populations throughout the year, and to determine what environmental factors stimulate or guide such movements.
4. To investigate nematocyst function and first aid measures for stings.

METHODOLOGY

1. Laboratory rearing efforts to elucidate the hitherto unknown life cycle stages.
2. An extensive field sampling program from ships and small boats has been carried out in an attempt to capture the varied free-swimming and sessile stages in offshore and coastal waters.
3. Tracking experiments are anticipated using ultrasonic transmitters attached to mature jellyfish.
4. Laboratory and field experiments using *in-vitro* assays and human volunteers have been carried out to assess sting treatments.

STATUS

1. All major ontogenetic stages of *Chironex fleckeri* have now been reared and observations made of their behaviour and physical tolerances.
2. Field sampling has located the source of newly-metamorphosed medusae in the upper reaches of tidal estuaries, suggesting these areas to be the spawning and nusery ground for the larval stages.
3. First aid research has revealed an unsuspected role for acetic acid solutions (vinegar) as a highly effective nematocyst inactivator in *Chironex* and other stinging jellyfish. Further studies of sting treatment from the standpoint of symptomatic relief are planned.

GEOGRAPHIC REGION: R

SHIP TIME REQUIREMENTS: Small boat sampling only - 36 days

MAJOR DESCRIPTORS: *Chironex fleckeri* /Scyphozoa/Life cycle/Differential distribution/Stinging organs/

[JAMESC038]

85 Larval growth, ecology and behaviour of commercially significant fish and crustacean species in the continental shelf zone of the Great Barrier Reef.

PERIOD: June 1984 -

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

PROJECT LEADERS: Dr R.F. Hartwick (077) 814272
Dr N.E. Milward (077) 814193

CONTACT OFFICER: Dr N.E. Milward

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

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

EXTERNAL SUPPORT: MSTGS - $18,000

OBJECTIVE

To address a number of specific aspects of the larval ecology and behaviour of several groups of crustacea and fish with realized or potential commercial significance. The work is building upon the findings of studies on the basic systematics, distributional and feeding ecology of these groups, with the goal of providing information crucial to managerial predictions of juvenile recruitment or to the establishment of mariculture schemes. Initial emphasis is being placed upon growth and feeding studies of selected fish species and upon the larval development and symbiotic associations in scyllaridean lobsters.

METHODOLOGY

Field collections will be based upon an intensive grid sampling programme in waters off Townsville, conducted at intervals of 5-7 days during the November-January period of known maximum production of target species. On each sampling day, ten to twelve large-volume tows will be made with a modified Tucker trawl and at each station hydrographic profiles and fine-mesh plankton tows will be made to assess environmental conditions and abundance of major food items. Observations and collections of phyllosoma larvae will also be made by teams of 3 or 4 drivers, followed by laboratory studies of live material in plankton kreisels.

STATUS

This project, in its initial stages, is a development from a previous sampling programme of fish and decapod species from the continental shelf zone of the Great Barrier Reef. This programme provided an excellent sample base for continued studies on the zooplankton of this zone and much of the effort this year has been directed towards the further analysis of these samples.
The major collecting and observations of this new project will commence late in the year.

CO-ORDINATION WITH OTHER PROJECTS

Collaboration with projects being carried out on ichthyoplankton by Dr J. Leis (Australian Museum) and by Dr D. McB. Williams (AIMS).

GEOGRAPHIC REGION: R

SHIP TIME REQUIREMENTS: 13 days

MAJOR DESCRIPTORS: Pisces/Crustacea/Commercial species/Ecology/Behaviour/

[JAMESC070]

86 Production of planulae in *Pocillopora damicornis* .

PERIOD: January 1984 - December 1984

ORGANIZATIONS: James Cook University of North Queensland
Department of Marine Biology,
Douglas,
Townsville, Qld 4811

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

PROJECT LEADERS: Dr C.G. Alexander (077) 814282
Mr P. Muir
Dr D. Ayer
Dr T. Done

CONTACT OFFICER: Dr C.G. Alexander

EXPENDITURE: $750 (this year), $750 (all years)

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

EXTERNAL SUPPORT: GBRMPA - $600

OBJECTIVE

To determine whether the larvae of the scleractinian coral *Pocillopora damicornis* releases larvae at regular intervals during the year and whether these larvae are sexually or asexually produced.

METHODOLOGY

Gel electrophoresis assay of adult and larval coral. Histology and scanning electron microscopy.
This is an Honours B.Sc project.

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: *Pocillopora damicornis* /Larvae/Reproduction (biological)/

[JAMESC077]

87 Reproductive biology of Caprellid-Amphipods.

PERIOD: January 1984 - December 1984

ORGANIZATION: James Cook University of North Queensland
Department of Marine Biology,
Douglas,
Townsville, Qld 4811

PROJECT LEADERS: Dr C.G. Alexander (077) 814282
Mr A. Lim (077) 814282

CONTACT OFFICER: Dr C.G. Alexander

EXPENDITURE: $260 (this year)

MANPOWER: 1.00 (this year)

OBJECTIVE

Embryology, growth, reproductive behaviour, brood sizes, breeding season of Caprellid Amphipods. A little known group occurring in very large numbers as a member of fouling communities.

METHODOLOGY

Rearing in laboratory conditions. Use of histological, electron microscopical video TV recording techniques.
This is a B.Sc project.

STATUS

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

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Amphipoda/Reproduction (biological)/Life history/

[JAMESC076]

88 Reproductive strategies and resource partitioning in comatulid crinoids at Lizard Island.

PERIOD: April 1981 - October 1985

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

Australian Museum
6-8 College Street,
Sydney, N.S.W. 2000

PROJECT LEADERS: Mr L. Vail (02) 3398340
Dr J. Lucas (077) 814412 (Ph.D. supervisor)
Dr F. Rowe (02) 3398340 (Ph.D. supervisor)

CONTACT OFFICER: Mr L. Vail

EXPENDITURE: $3,500 (this year), $9,000 (all years)

MANPOWER: 1.00 (this year), 1.50 (all years)

EXTERNAL SUPPORT: Macquarie University,//Department of Environmental Studies - $1,000

OBJECTIVE

To determine reproductive patterns in seven species of commonly occurring comatulid crinoids at Lizard Island. To describe short term variation in spatial and temporal patterns of distribution, abundance, and size class structure for crinoids in various reef habitats.

METHODOLOGY

Reproductive patterns were determined through histological analysis of genital pinnules which were collected at regular intervals over two years. Aspects of crinoid population biology and dynamics were monitored, every 2-3 months for one year, for those crinoids contained in transects established at three depths at each of four stations.

STATUS

Field work was completed in March 1983. Reproductive patterns of five of the seven study species have been analyzed. This is the first long term study on reproductive patterns of Great Barrier Reef crinoids. Most of the population biology data remains to be analyzed although preliminary results show strong circadian rhythms with some species being distinctly nocturnal. New species of crinoids were collected during the nocturnal studies and have been described.

LOCALITY: Lizard Island

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Crinoidea/Reproduction (biological)/Population dynamics/

[JAMESC075]

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89 Studies on the biology of Grunters (Teleostei: Pomadasyidae) from north Queensland waters.

PERIOD: March 1980 - March 1986

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

PROJECT LEADERS: Mr T.M. Bade (077) 814171
Dr N.E. Milward (077) 814193

CONTACT OFFICER: Mr T.M. Bade

EXPENDITURE: $2,300 (this year), $7,000 (all years)

MANPOWER: 0.50 (this year), 1.60 (all years)

OBJECTIVES

To study the growth, breeding cycles and feeding of four species of pomadasyid fishes in Cleveland Bay near Townsville, and in local estuaries.
To document the larval and early juvenile stages of the species in local waters.

METHODOLOGY

Monthly trawl samples of the four species have been collected in Cleveland Bay and supplementary data are being collected in local estuaries. A tagging program is being undertaken on most abundant species. It is intended to raise young fish in aquaria from artificially fertilized eggs.

STATUS

Three years of trawl sampling have been completed and data on length, weight, age and feeding have been collected. Approximately 980 fish have been tagged and 130 have been recovered to date, with freedom times up to eight months. The larval development work is still to be completed.

LOCALITY: Cleveland Bay

GEOGRAPHIC REGION: R

SHIP TIME REQUIREMENTS: Six days

MAJOR DESCRIPTORS: Pomadasyidae/Growth/Feeding/Life cycle/Larvae/

[JAMESC015]

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90 **Studies on the reproduction and growth of flatfish species (Teleostei : Pleuronectiformes) from waters off Townsville.**

PERIOD: February 1984 - December 1984

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

PROJECT LEADERS: Miss S. Mildner (077) 814844
Dr N.E. Milward (077) 814193

CONTACT OFFICER: Dr N.E. Milward

EXPENDITURE: $200 (this year), $200 (all years)

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

OBJECTIVE

An assessment is being made of the size and age at sexual maturity and of the number and duration of breeding periods throughout the year, for each species. Fecundities are being determined to find whether a relationship exists between the number of eggs to be spawned in each batch and the egg and fish sizes. Growth patterns of the fishes are being assessed and comparisons made between growth in the field and under artificial aquarium conditions.

METHODOLOGY

Monthly sampling trawls and cast-netting of coastal inshore waters over 9 months have provided a range of specimen sizes. Length-frequency distributions have been compared each month and growth patterns determined by length- weight regression coefficient analysis throughout the year, for species caught in the field and one species also kept in an aquarium.

Gonad somatic indices have been determined, and proportions of egg sizes and stages of development made by routine histological sectioning and staining. Fecundities have been determined gravimetrically, by counting a weighed proportion of eggs from the mid-section of the upper ovary.

To determine age of the fish, otoliths have been ground, etched and examined under high power optical and scanning electron microscopes.

STATUS

The data have been compiled to be submitted as an Honours thesis.

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: Townsville

GEOGRAPHIC REGION: R

SHIP TIME REQUIREMENTS: 10 days (combined with other research and teaching cruises).

MAJOR DESCRIPTORS: Teleostei/Fecundity/Reproduction (biological)/Growth/

[JAMESC073]

91 **The culture of the giant clam (Tridacnidae) for food and restocking of tropical reefs.**

PERIOD: July 1984 - June 1987

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

PROJECT LEADERS: Prof C. Burdon-Jones (077) 814530
Dr J. Lucas (077) 814412
Dr J. Munro (077) 814122

CONTACT OFFICER: Dr J. Lucas

EXPENDITURE: $155,634 (this year), $496,070 (all years)

MANPOWER: 8.00 (this year), 24.00 (all years)

EXTERNAL SUPPORT: ACIAR - $496,070 (Additional funding is provided for overseas collaborating institutions.)

OBJECTIVES

1. To assess tridacnid stocks at various localities.
2. To study growth rates in natural populations and the effects of environmental factors.
3. To elucidate the reproductive biology of giant clams.
4. To determine the optimum conditions for development of larvae and juveniles.
5. To apply the results of this research to the development of large-scale mariculture techniques for production of giant clams for food and restocking reefs.

METHODOLOGY

James Cook University will collaborate in all aspects of this research with four institutions in developing countries: University of Papau New Guinea; Ministry of Agriculture and Fisheries, Fiji; Silliman University, Negros, Philippines; and University of the Philippines. Different aspects of the research will require a wide range of field and laboratory techniques.

STATUS

Preliminary planning for the project occurred through 1983 and early 1984. Funding of the project commenced in July 1984 and, since then, staff appointments have been made and the research commenced. A meeting of representatives from all the participating institutions will be held in November 1984 to review initial progress, standardise techniques and coordinate the research at the various centres.

CO-ORDINATION WITH OTHER PROJECTS

This project is associated with the International Giant Clam Research Program which was initiated by the International Centre for Living Aquatic Resources Management. It is coordinated with a major survey of giant clam stocks in the Great Barrier Reef region by Queensland Department of Primary Industries, Fisheries Division.

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Tridacna/Commercial species/Growth/Reproduction (biological)/Aquaculture/

[JAMESC078]

92* **General biology of the Hairy mussel *Trichomya hirsuta* (Lamarck).**

PERIOD: January 1982 - November 1983

ORGANIZATION: University of New South Wales
School of Zoology
P.O. Box 1
Kensington, N.S.W. 2033

PROJECT LEADERS: Ms L. Goggin (02) 6622730
Dr R.J. MacIntyre (02) 6622730

CONTACT OFFICER: Ms L. Goggin

EXPENDITURE: $1,000 (this year), $2,000 (all years)

MANPOWER: 1.00 (this year), 2.00 (all years)

EXTERNAL SUPPORT: Dr R.J. MacIntyre

OBJECTIVES

General Biology: Determination of: 1. Growth rates of latitudinally separated populations.
2. Reproduction - determine reproductive cycle - spawning period etc.
3. Larval culture - identification of *T. hirsuta* larval stages.
4. Internal anatomy.

METHODOLOGY

1. Growth rate - cages located at Eden, Lake Macquarie, Port Stephens, Brisbane, Townsville.
2. Reproduction - histology of gonad condition index.
3. Larval culture - laboratory rearing.
4. Internal anatomy - microscopical and histological examination.

STATUS

1. Growth rates
- 12 months growth data from cages has been collected
- 12 months length frequency data collected
- very slow growth rate indicated.
2. Reproduction
- 12 months samples collected for histology
- 12 months samples collected for condition
- appear to breed throughout the year.
3. Larval culture - to be commenced
4 Internal anatomy - microscopial examinations 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 REGIONS: R,Q,N

MAJOR DESCRIPTORS: *Trichomya hirsuta* /Bivalvia/Reproduction (biological)/Life cycle/Anatomy/

[UNINSW030]

93 Reproduction and recruitment of giant clams (Tridacnidae) and dietary preference of larvae of *Tridacna* .

PERIOD: November 1983 - December 1986

ORGANIZATIONS: University of New South Wales
Zoology Department,
P.O. Box 1,
Kensington, N.S.W. 2033

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

PROJECT LEADERS: Dr R.J. MacIntyre (02) 6622110
Dr J. Bunt (077) 789211
R.D. Braley

CONTACT OFFICER: Dr R.J. MacIntyre

EXPENDITURE: $13,119 (this year)

MANPOWER: 1.20 (this year)

EXTERNAL SUPPORT: MSTGS - $58,839

OBJECTIVE

The central aim is the survival of giant clams, from the threat of extensive population damage to Pacific area populations. It is time for serious scientific study of their natural breeding and recruitment, together with artificial rearing work and study of larval nutrition to enable damaged populations to be re-established.

METHODOLOGY

Field study sites set up at 4 reefs: at one reef monthly gonad biopsy extraction samples are taken and examined microscopically, and one reef is sampled by the same method quarterly. Spatial distribution, recruitment and natural spawning studies are done within gapped study sites. Broodstock collection, holding, induced spawning, larval rearing and larval dietary preference studies are being done at Lizard Island Research Station, where high densities of clam populations are found.

STATUS

Preliminary results indicate an austral summer spawning for the 2 largest species of *Tridacna* . Natural spawning observations show a dual periodicity for *T. gigas* , sperm only has been observed spawned in nature. Recruitment at one site comprised 1.2% and 1.5% of populations of *T. gigas* and *T. derasa* , respectively. Statistically, *T. gigas* and *T. derasa* clump by species and prefer certain substrates over others. Larval rearing work just begining.

CO-ORDINATION WITH OTHER PROJECTS

None at present, possible future coordination with ACIAR clam project. James Cook University.

GEOGRAPHIC REGION: R

SHIP TIME REQUIREMENTS: 68 day

MAJOR DESCRIPTORS: Tridacna/Recruitment/Reproduction (biological)/Larvae/Feeding/

[UNINSW035]

94* **Australian synodontidae.**

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

PROJECT LEADER: Prof. J.M. Thomson (07) 3772451

CONTACT OFFICER: Mr E. Adjei (07) 3772992

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

MANPOWER: 1.40 (this year), 5.50 (all years)

OBJECTIVE

The taxonomy and basic biology of synodontidae in Australian seas, including growth rates, feeding, parasite infestation and reproduction.

METHODOLOGY

Shipboard collections preserved. Biometrics; laboratory studies on food items, fecundity, gonad development, parasite infestation, etc.

STATUS

Continuing; taxonomic work is completed; biological analysis is proceeding.

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

SHIP TIME REQUIREMENTS: 25 days

MAJOR DESCRIPTORS: Taxonomy/Ecology/Parasites/Synodontidae/Pisces/

[UNIQLD015]

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95 **Functional morphology and phylogeny of barnacles (Cirripedia).**

PERIOD: January 1978 -

ORGANIZATION: University of Sydney
School of Biological Sciences
Zoology Building, A08
Sydney, N.S.W. 2006

PROJECT LEADER: Prof D.T. Anderson (02) 6922438

OBJECTIVE

To elucidate the functional morphology of the barnacles of eastern Australia and their phylogenetic evolution. A major emphasis is placed on studies of feeding mechanisms.

METHODOLOGY

Approximately forty species are being studied in phylogenetic sequence. Their anatomy is investigated in detail using light microscopy, histology and scanning electron microscopy. Experiments are carried out on responses to water currents and food, using cinematographic techniques to analyse patterns of movement under controlled conditions.

STATUS

Results so far have elucidated functional relationships between the wall, operculum, body, limbs and mouthparts of a number of species with respect to growth forms, feeding machanisms and protective closure. A remarkable diversity of function among barnacles is emerging from these studies, with significant implications for adaptation to environment and for barnacle phylogeny.

GEOGRAPHIC REGIONS: B,R,Q,N,T

MAJOR DESCRIPTORS: Cirripedia/Morphology (organisms)/Feeding/Phylogeny/

[UNISYD013]

96 Recruitment of Coral Reef Fishes.

PERIOD: July 1980 - December 1984

ORGANIZATION: University of Sydney
School of Biological Sciences,
Sydney, N.S.W. 2006

PROJECT LEADER: Assoc Prof P.F. Sale (02) 6922440

EXPENDITURE: $26,792 (this year), $97,034 (all years)

MANPOWER: 1.40 (this year), 5.00 (all years)

EXTERNAL SUPPORT: MSTGS - $26,792

OBJECTIVE

To assess impact of juvenile recruitment variability and juvenile predation on reef fish communities. Emphasis is placed on variability in rates of recruitment, on rates of early post-settlement mortality, and on the role of predators in determining early mortality.

METHODOLOGY

Standard observational and manipulative field ecological techniques are being used.

STATUS

Rates of juvenile recruitment have been measured each summer using coral recruit traps, monitored patch reefs, and transects at One Tree reef. Rates of juvenile mortality are being estimated by monitoring known individuals. Effects of predators are explored in caging studies.

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

LOCALITY: One Tree Island

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Coral reefs/Pisces/Recruitment/Predation/Mortality/

[UNISYD041]

97 Genetic structure of coral populations.

PERIOD: March 1981 - December 1983

ORGANIZATION: University of Western Australia
Department of Zoology
Nedlands, W.A. 6009

PROJECT LEADER: Mr J.A. Stoddart (077) 789211 (AIMS)

EXPENDITURE: $2,000 (this year), $5,500 (all years)

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

EXTERNAL SUPPORT: Australian Coral Reef Society - $500
AIMS - $100

OBJECTIVE

Assess the genetical structure of populations of *uPocillopora damicornis* and examine the role of reproductive mode in contribution to the genetic diversity of individual populations and the connectivity of members of sets of populations.

METHODOLOGY

1. Gel electrophoresis. 2. Histology. 3. Growth estimates.

STATUS

New facts on population structure of corals have been derived: study is now involved in elaborating the impact of these developments.

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: W,R

MAJOR DESCRIPTORS: *Pocillopora damicornis* /Anthozoa/Population genetics/

[UNIWA-016]

See also: 35, 108*, 178*, 204, 205, 207

98 Taxonomy of the common dictyoceratid sponges of the Great Barrier Reef.

PERIOD: January 1984 - December 1985

ORGANIZATION: Australian Institute of Marine Science
PMB 3,
Townsville, Qld. 4810

PROJECT LEADERS: Dr C. Wilkinson (077) 789211
Dr J.A. Stoddart (077) 789211

CONTACT OFFICER: Dr C. Wilkinson

EXPENDITURE: $12,300 (this year), $12,300 (all years)

MANPOWER: 0.53 (this year), 0.53 (all years)

EXTERNAL SUPPORT: ABRS - $10,000

OBJECTIVE

To clarify the systematics and taxonomy of the common dictyoceratid sponges of the Great Barrier Reef, and document these findings.

METHODOLOGY

Character sets will include both morphological and electrophoretic characters, as well as reproductive criteria. Analysis of character sets will be by classical and numeric methods.

STATUS

A preliminary study of sponges from the genera *Carterospongia* and *Phyllospongia* was carried out as part of a joint project with sponge taxonomists from AIMS and the University of Auckland. This study confirmed the utility of electrophoretic and numeric techniques to be used more extensively in the latter stages of this project.

GEOGRAPHIC REGION: R

SHIP TIME REQUIREMENTS: 12

MAJOR DESCRIPTORS: Taxonomy/Sponges/ *Carterospongia* / *Phyllospongia* /

[AIMS--008]

99 Taxonomic revision of the cephalochordata.

PERIOD: January 1983 - December 1985

ORGANIZATION: Department of Home Affairs and Environment
Bureau of Flora and Fauna,
P.O. Box 1383 G.P.O.,
Canberra, A.C.T. 2601

PROJECT LEADER: Dr B.J. Richardson (062) 467481

EXPENDITURE: $300 (all years)

MANPOWER: 0.05 (this year), 0.20 (all years)

OBJECTIVE

To revise the taxonomy of the temperate and tropical cephalochordates of Australia using morphological and biochemical (electrophoresis) characteristics. To identify distributions and habitat preferences of the species.

METHODOLOGY

Morphometric analysis of body parameters and comparative electrophoresis of enzymes.

STATUS

The status and distribution of the two southern species have been determined. The distribution of the five plus tropical species is still under study. Several species complexes are involved and further work will be concentrated on determining the number of species in these groups using electrophoresis. A key has been prepared to all known Indo- Pacific species.

GEOGRAPHIC REGIONS: A,R

MAJOR DESCRIPTORS: Cephalochordata/Taxonomy/Distribution patterns/

[DHAE--009]

100* **Population genetics of the Crown-of-Thorns starfish.**

PERIOD: January 1979 - December 1983

ORGANIZATION: James Cook University of North Queensland
Department of Zoology
Post Office
Townsville, Qld 4811

PROJECT LEADERS: Dr J.S. Lucas (077) 814111
Mr M. Nishida
Dr M. Goddard

CONTACT OFFICER: Mr W. Nash (077) 814111

EXPENDITURE: $1,500 (this year), $12,000 (all years)

MANPOWER: 0.90 (this year)

EXTERNAL SUPPORT: MST - $5,971 (Part of grant for studying *Acanthaster* biology)
GBRMPA - $500

OBJECTIVE

To determine the levels of genetic variation between populations of *Acanthaster planci* in the Great Barrier Reef region and at other localities in the Pacific region. From these data the levels of gene-flow between proximate and distant populations of *Acanthaster* will be inferred.

METHODOLOGY

Genetic information for *Acanthaster* populations is obtained by studying allozyme frequencies using starch and acrylamide gel electrophoresis.

STATUS

The project involved several years developing electrophoresis and staining techniques appropriate to starfish tissue. The research is now in a phase of data accumulation. No systematic data analysis has been made yet. In 1982, and possibly 1983, overseas samples will be obtained.

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,O

MAJOR DESCRIPTORS: *Acanthaster planci* /Asteroidea/Racial studies/Population genetics/Genetic isolation/

[JAMESC051]

101* **Ostracoda and environment - northern Australia, Indopacific.**

ORGANIZATION: Riverina College of Advanced Education
School of Applied Science
P.O. Box 588
Wagga Wagga, N.S.W. 2650

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

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

EXPENDITURE: $11,166 (all years)

MANPOWER: 0.12 (this year), 0.84 (all years)

EXTERNAL SUPPORT: ARGS - $1,960 (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.

GEOGRAPHIC REGIONS: E,Y,C,J,R

MAJOR DESCRIPTORS: Ostracoda/Taxonomy/Distribution patterns/Abiotic factors/Biotic factors/

[RCAE--001]

102* **Taxonomy and ecology of benthic invertebrates from Heron Island, Queensland.**

PERIOD: November 1980 -

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

PROJECT LEADER: Dr T.S. Hailstone (07) 3772508

EXPENDITURE: $24,840 (this year)

EXTERNAL SUPPORT: AMSTAC-FAP - $24,840

OBJECTIVES

To publish a series of field guides and handbooks which will enable research workers and others to identify the species in selected groups of marine benthic invertebrates that can be found at Heron Island and adjacent areas at the southern end of the Great Barrier Reef. Study has commenced with selected groups of molluscs anthropods and echinoderms.

To investigate the habitats, habits, resource utilization and breeding activities of species covered by these handbooks.
Overall this project should serve to collate much of the relevant information which is scattered through literature and provide reference bases upon which more extensive ecological studies can be planned for this area.

METHODOLOGY

Individual workers with expertise and interest in specified benthic invertebrate groups are encouraged to participate in collection of relevant groups of animals. Specimens in these collections are identified and their distribution records (geographic and habitat) are compiled for construction of the handbooks. Subsequently, literature records and records from museum collections are to be incorporated. As handbooks are compiled, it is hoped that the information can be assembled in a form whereby it can form part of a more extensive computer data storage system which would be available to a wide range of potential users in Australia.

STATUS

Preliminary manuscripts are near completion for nudibranchs and holothurians. Work is underway on manuscripts for prosobranch gastropods and isopods. Others who have shown interest in the project but who have not yet been recruited (because of shortage of funds) are likely to begin manuscripts on crabs, sponges, shrimps, amphipods and bivalves.

LOCALITY: Heron Island

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Invertebrata/Benthic environment/Taxonomy/Ecology/

[UNIQLD010]

103 Oysters of the Indo-West Pacific region (Bivalvia : Ostreidae and Gryphaeidae).

PERIOD: December 1975 -

ORGANIZATIONS: Western Australian Museum
Department of Malacology
Francis Street
Perth, W.A. 6000

University of New South Wales
Department of Zoology
Kensington, N.S.W. 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 - Research vessel Flinders at Shark Bay, W.A.; assistance with collecting, staff, transport.)
Department of Zoology, University of Hong Kong (Assistance with collecting - staff, transport, lab space, use of facilities.)
Lembaga Oseanologi Nacional Jakarta, Indonesia (Assistance with collecting - staff, lab space and use of facilities in Jakarta

and at Research Station, Pulau Pari.)
Bureau of Fisheries, Manila, Philippines (Assistance with collecting - staff and transport.)
N.T. Dept of Fisheries (Collecting, staff, transport.)
University of Papua New Guinea. Dept of Biology (Assistance with collecting, staff, transport, accomodation.)
Dept Zoology, James Cook University of North Queensland (Administrative assistance.)
Australian Institute of Marine Science (Assistance with collecting, staff, transport.)
NSW Dept of Agriculture (Divn of Fisheries) (Assistance with 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 13 currently recognised Australian oyster species have Indo-Pacific affinities. The remaining southern Australian species appears to be endemic. Recent work has been concentrated on the 3 *Saccostrea* (rock oyster) species with anatomical and electrophoretic studies stressing inter-population variation. All 13 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: Bivalvia/Ostreidae/Gryphaeidae/Taxonomy/Biogeography/

[WAMUS-008]

See also: 1, 58*, 95, 170, 177*

104 An illustrated key to the parrotfishes of the Great Barrier Reef.

ORGANIZATION: Australian Museum
Department of Fishes
P.O. Box A285
Sydney South, N.S.W. 2000

PROJECT LEADER: Dr J.H. Choat (02) 3398111

CONTACT OFFICER: Dr J.R. Paxton (02) 3398111

EXTERNAL SUPPORT: MSTGS - $6,645
GBRMPA - $9,900

OBJECTIVE

To produce an appropriately illustrated key to allow for rapid identification of the approximately 25 species of parrotfishes (Scaridae) which occur on the Great Barrier Reef.

METHODOLOGY

The project involved 3 trips to the northern Great Barrier Reef to collect and photograph additional species of parrotfishes. These occurred during March, June and November of 1982. In November I was joined by Dr J. Randall, Bishop Museum, for an examination of Museum collections and further field work. Field collecting and museum work was completed by December 1982.

STATUS

Most outstanding taxonomic problems have been clarified although the identity of two species remains problematical. At present we hold most of the required illustrative material. Field work has been completed.

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Scaridae/Identification keys/Taxonomy/

[AUSMUS002]

105 Taxonomy and ecology of larval and adult fishes.

PERIOD: January 1979 -

ORGANIZATIONS: Australian Museum
Ichthyology Department
P.O. Box A285
Sydney South, N.S.W. 2000

Lizard Island Research Station
PMB 37
Cairns, Qld 4870

PROJECT LEADERS: Dr J.M. Leis (02) 3398111 (Ext 262)
Dr B. Goldman (070) 534500

CONTACT OFFICER: Dr J.M. Leis

EXPENDITURE: $30,000 (this year)

MANPOWER: 1.25 (this year)

EXTERNAL SUPPORT: GBRMPA - $4,000 (Shiptime, equipment)
MSTGS - $176,000
ABRS - $15,000
CSIRO

OBJECTIVE

To study the taxonomy and ecology of larval fishes in the Great Barrier Reef and elsewhere.

METHODOLOGY

Ecological collections are made and studied. Taxonomic collections are made and studied.

STATUS

Research now concentrating on area immediately seaward of outer Barrier Reefs (i.e. Coral Sea). Distribution of reef fish is being examined to 15KM seaward of outer reefs in Lizard Island Region. Taxonomic research is being emphasized with studies of *Plectropomus* , Ostraciids, Lutjanids, pseudochromids and apogonids 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/Pisces/Larvae/

[AUSMUS008]

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106 **Genetic variability among geographically isolated nesting populations of *Caretta caretta* .**

PERIOD: January 1983 - December 1983

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

Monash University (Subcontract)
P.O. Box 92
Clayton, Vic. 3168

PROJECT LEADERS: Dr W. Craik (077) 818811
Ms E. Gyuris (03) 5410811

CONTACT OFFICER: Dr W. Craik

EXPENDITURE: $972 (all years)

MANPOWER: 2.00 (all years)

OBJECTIVE

To determine the genetic distinction between the Mon Repos and Capricorn-Bunker loggerhead turtle populations.

METHODOLOGY

Electrophoretic investigation of polymorphic proteins.

STATUS

Report submitted to 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.

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: *Caretta caretta* /Reptilia/Genetics/Geographical isolation/Population genetics/

[GBRMPA057]

See also: 94*

107* Biochemical ecology of algal-invertebrate symbioses.

PERIOD: July 1979 -

ORGANIZATIONS: Australian National University
Department of Environmental Biology
P.O. Box 475
Canberra City, A.C.T. 2601

Australian Institute of Marine Science
P.M.B. 3
Townsville M50, Qld 4810

PROJECT LEADERS: Dr R.E. Summons (062) 493235
Dr C.R. Wilkinson
Prof C.B. Osmond

CONTACT OFFICER: Dr R.E. Summons

EXPENDITURE: $50,000 (this year), $70,000 (all years)

MANPOWER: 1.50 (this year), 2.10 (all years)

EXTERNAL SUPPORT: AMSTAC-FAP - $20,393

OBJECTIVES

1. To investigate aspects of nitrogen assimilation and metabolism in algal-invertebrate associations and to study the relationship between nitrogen availability and photosynthesis behaviour of the algae *in vitro* and *in vivo* . Specific organisms under investigation are the zooxanthella *Gymnodinium microadriaticum* and its hosts in the genus *Tridacna* and *Pocillopora* . Certain sponges harboring symbiotic blue-green algae are also being studied.
2. To investigate the assimilation, metabolism and accumulation of arsenic in algal-invertegrate associations and determine the chemical structures of the organo-arsenicals produced by these associations.

METHODOLOGY

Nitrogen metabolism is being monitored using stable isotope (^{15}N) labelled substrates and mass spectrometry. Concurrently, carbon metabolism is being studied with the radio isotope ^{14}C using liquid scintillation counting and radiochromatography. Feeding experiments are conducted in the field using algae isolated from specific hosts and on intact symbiotic associations. Subsequently, samples are returned to the laboratory for mass spectrometric analysis and radioisotope determinations.
As far as is possible tracer experiments are carried out *in situ* so as to minimise damage to organisms which would perturb matural behaviour.

STATUS

A systematic study of ammonia assimilation in *G. microadriaticum* from *Tridacna* sp., both *in vitro* and *in vivo* is almost completed. Assimilation is light dependent and occurs via the GS-GOGAT enzyme pathway. New methodology has been developed to study these enzyme reactions. The rate of carbon assimilation has been shown to be intimately linked to ammonia availability with significant differences observed in the behaviour of isolated algae and intact symbioses.

GEOGRAPHIC REGION: R

SHIP TIME REQUIREMENTS: Seven days for collection of organisms and 'in-field' experiments.

MAJOR DESCRIPTORS: Invertebrata/Algae/Symbiosis/Biochemistry/

[ANU---002]

108* **Sensory systems of the shrimp *Acetes* in relation to behaviour.**

PERIOD: August 1974 -

ORGANIZATIONS: Australian National University
Department of Neurobiology
Research School of Biological Sciences
P.O. Box 475
Canberra City, A.C.T. 2601

Australian Institute of Marine Science
P.M.B. No. 3
Townsville, M.S.O., 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), 4.50 (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

Six papers in preparation on structure and ultrastructure of eyes, statocyst and antennal setae, research still continuing on these topics.
Data for several other papers on activity patterns and other aspects of natural history including mating, moulting and schooling has been collected - research is continuing.

GEOGRAPHIC REGIONS: R,Q,N

MAJOR DESCRIPTORS: *Acetes* /Malacostraca/Neurophysiology/Behaviour/

[ANU---008]

109* **Bacterial production in sediments.**

PERIOD: June 1979 -

ORGANIZATION: CSIRO
Division of Fisheries Research
CSIRO Marine Laboratories
P.O. Box 120
Cleveland, Qld 4163

PROJECT LEADER: Dr D.J.W. Moriarty (07) 2862022

EXPENDITURE: $20,600 (this year), $77,300 (all years)

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

OBJECTIVE

To measure biomass and productivity of bacteria and other microorganisms in sediments and the water column and to study their interrelationships with primary producers in order to assess their role in food chains.

METHODOLOGY

Biochemical assays for muramic acid, DNA synthesis, chlorophylla; microscopical counting; C, N analysis.
Methods have been developed for measuring biomass and growth rate of bacteria and are being used to measure productivity particularly in seagrass beds and coral reef areas.

STATUS

Methods developed are being applied to measurements of bacterial production in seagrass and coral reef sediments and to the water column.

GEOGRAPHIC REGIONS: R,Q,N

MAJOR DESCRIPTORS: Bacteria/Sediments/Primary production/Trophic relationships/Nutrient cycles/

[CSIRO-040]

110 Cold and heat tolerances of mangrove and sea grass species correlated with latitudinal distribution.

PERIOD: October 1981 - December 1984

ORGANIZATION: CSIRO
Division of Food Research
Food Research Laboratory
P.O. Box 52
North Ryde, N.S.W. 2113

PROJECT LEADER: Dr R.M. Smillie (02) 8878333

EXPENDITURE: $8,930 (all years)

MANPOWER: 0.15 (this year), 0.75 (all years)

EXTERNAL SUPPORT: AMSTAC - $8,930

OBJECTIVES

1. To demonstrate the application in the field of marine science of new, rapid methods for determining cold and heat tolerances of different plant species.
2. To determine if there is a correlation between cold and heat tolerances of different species of mangroves and sea grasses and their distribution along the eastern coast of Australia.

METHODOLOGY

Relative cold or heat tolerances were determined by the decreases in chlorophyll fluorescence *in vivo* induced by standardized cold or heat treatments.

STATUS

1. Our methods for estimating cold and heat tolerance of vegetative tissue, originally developed for crop plants, has been demonstrated to work for mangroves, sea grasses an marine green macroalgae. 2. Of 27 different mangrove species from the Great Barrier Reef area examined for cold tolerance, those confined to latitudes below 20° were cold intolerant, while those whose distribution also spreads to higher latitudes showed a range of chilling tolerances, probably in part reflecting their botanical diversity. However, within genera, cold tolerance was correlated with the occurrence of species at increasingly higher latitudes. All mangrove species showed a high degree of heat tolerance.
3. Green macroalgae from Davis Reef were extremely cold intolerant, as were tropical species of sea grasses. Species confined to south-eastern Australia were quite tolerant of cold. *Halophila avalis* from eastern and southern Australia were markedly different in cold tolerance, possibly indicating that they are different species. Further work has been shelved until a sponsor is found.

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

CO-ORDINATION WITH OTHER PROJECTS

Future work will involve collaboration with scientists at the Australian Institute of Marine Science. The study will coordinate with research projects on mangroves carried out by Dr T.J. Andrews and B. Clough.

GEOGRAPHIC REGIONS: R,Q,N

MAJOR DESCRIPTORS: Temperature tolerance/Distribution patterns/Angiospermae/*Avicennia marina* /Limiting factors/

[CSIRO-013]

111* Physiology of Penaeid prawns.

PERIOD: July 1976 -

ORGANIZATION: CSIRO
Division of Fisheries Research
CSIRO Marine Laboratories
P.O. Box 120
Cleveland, Qld 4163

PROJECT LEADER: Dr W. Dall (07) 2862022

EXPENDITURE: $30,000 (this year), $593,000 (all years)

MANPOWER: 3.00 (this year), 17.00 (all years)

OBJECTIVES

To study:
1. Osmotic and ionic regulation of selected species.
2. The lipid and protein metabolism of *Penaeus esculentus* (tiger prawn); Uptake and utilization of lipids particularly during the moulting cycle; the role of amino acids and body muscle as an energy source in normal metabolism.

METHODOLOGY

Osmotic concentration by Clifton Technical Physics Cryoscope; chlorides by LKB Chloridometer; other major ions by atomic absorption spectrophotometer. Lipids as total crude lipid gravimetrically following solvent extraction; individual lipids by High Pressure Liquid Chromatography (HPLC) and Gas Liquid Chromatography (GLC) total protein and free amino acids by a ninhydrin method; excreted N by ion-selective electrodes as ammonia and by a ninhydrin method; specific amino acids by High Pressure Liquid Chromatography uptake and turnover of specific lipids and amino acids by tritium or ^{14}C labelled compounds; oxygen consumption by intermittent flow respiratory chamber and oxygen electrode.

STATUS

Osmotic and ionic regulations: Demonstration that early juveniles are osmotically more adaptable than adults for four species and this is related to juvenile habitat preferences; all major ions are regulated with a zone of instability at a salinity of about 40% shown in magnesium regulation.
Lipid and protein metabolism: Stored digestive gland lipids are used mainly in preparation for moulting, but are used during early starvation. Proteins are also metabolised during early starvation and become the principal energy source. Standard and routine metabolic rates have been established; metabolic rate is reduced during starvation by decreased nocturnal activity.

GEOGRAPHIC REGIONS: C,R,Q

MAJOR DESCRIPTORS: Penaeidae/Malacostraca/Osmoregulation/Metabolism/

[CSIRO-056]

112 **The effects of fuel oil, oil emulsifier and lower salinity upon the common Indo-Pacific reef coral *Acropora formosa* .**

PERIOD: 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 Science
Post Office
Townsville, Qld 4811

PROJECT LEADERS: Dr W. Craik (077) 818811
Mr P. Harrison (077) 814111

CONTACT OFFICER: Ms E. Eager (077) 818811

EXPENDITURE: $284 (this year), $2,784 (all years)

MANPOWER: 1.00 (this year), 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

Report to be completed and submitted to GBRMPA.

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: *Acropora formosa*
/Anthozoa/Histology/Ultrastructure/Pollution effects/

[GBRMPA066]

113 **Chemical Regulation of Biological Processes. Host Release Factors in Marine Symbioses.**

PERIOD: February 1983 - February 1987

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

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

EXPENDITURE: $25,736 (this year), $34,548 (all years)

MANPOWER: 0.50 (this year), 0.70 (all years)

EXTERNAL SUPPORT: MSTGS - $25,736 (1984)

OBJECTIVE

Symbiosis is an important phenomenon in the marine environment. Zooxanthellae (the algal symbiont) contribute significantly to world ocean productivity and particularly to coral reef benthic primary productivity. The zooanthellae have an important role in the nutrition of the host animals and are essential for the skelton building process in hard corals.

Translocation of fixed carbon from the zooxanthellae to the host is controlled by the host chemically using "host release factors". This project aims to isolate, purify and identify the compound(s) which are utilised by marine invertebrates of marine invertebrate-zooxanthellae symbiotic associations to achieve release of nutrients from the zooxanthellae symbiont.

METHODOLOGY

This project depends on an ability to assay for the release of nutrients from the algal symbionts. This is achieved by isolation of algal cells from the marine invertebrate-zooxanthellae association, incubation of algal cells with $NaH^{14}CO_3$ to obtain incorporation of radioactivity into the products of photosynthesis and examination of release caused by extracts of the host. Various separation techniques will be employed, eg. gel permeation, adsorption, reverse-phase adsorption and ion-exchange chromatography, electrophoresis, isoelectric focussing, in order to isolate the host release factors.

STATUS

Currently two marine invertebrate/zooxanthellae systems are being investigated. The algal symbionts from the sea aneome *Stichodactyla hadonni* and a soft coral have been identified using electron microscopy as *Symbiodinium microadriaticum* . The bioassay for the detection of host release factor is being established.

CO-ORDINATION WITH OTHER PROJECTS

This project is examining the chemical aspects of host release factor and collaboration exists with Dr R. Hine, School of Biological Science, the University of Sydney, and Dr M. Borowitska, School of Environmental and Life Sciences, Murdoch University, who are examining the biological side of control substances in symbioses and nutritional and eco-physiological aspects of symbiosis between algae and invertebrates.

GEOGRAPHIC REGIONS: R,Q

MAJOR DESCRIPTORS: Invertebrata/Algae/Symbiosis/Biochemical analysis/Hosts/

[GRIFFI011]

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114 Eye structure in polychaetes.

ORGANIZATION: James Cook University of North Queensland
Post Office
Townsville, Qld 4811

PROJECT LEADERS: Dr C.G. Alexander (077) 814282
Mr R.S. Smith

CONTACT OFFICER: Dr C.G. Alexander

EXPENDITURE: $1,000 (this year)

MANPOWER: 1.10 (this year)

OBJECTIVE

Investigate the fine structure of the eyes of serpulid (polychaete) worms from a functional, behavioural and possibly evolutionary viewpoint. Developmental biology of polychaete eyes.

STATUS

Fine structure of some adult eyes determined. Larval eyes and their development investigated.

GEOGRAPHIC REGIONS: Q,R

MAJOR DESCRIPTORS: Serpulidae/Annelida/Eyes/Evolution/Behaviour/

[JAMESC058]

115 Monitoring heavy metal pollution in tropical marine waters.

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

PROJECT LEADERS: Prof C. Burdon-Jones (077) 814530
Dr G. Denton (077) 814191

CONTACT OFFICER: Prof C. Burdon-Jones

EXPENDITURE: $34,882 (this year), $34,882 (all years)

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

OBJECTIVES

1. To establish current baseline levels and distribution of heavy metals, i.e. mercury, cadmium, lead, copper, zinc and nickel in a range of dominant marine organisms at various trophic levels in the food chain within the Great Barrier Reef province.
2. To determine regional and seasonal fluxes of metals in potentially useful sentinel organisms from strategically located stations within the reef system.
3. Prescribe an efficient readily implemented monitoring system for tropical waters of Australia.

METHODOLOGY

1. Baseline Survey (18 months). Seawater, algae, bivalves, hard and soft corals holothurians and a variety of fish of recreational and commercial importance have been collected from stations in the northern, central and southern regions of the Great Barrier Reef.
2. Seasonal Survey (12 months). Potentially useful sentinel species identified from the baseline survey were sampled at regular intervals from Lizard, Urpheus and Heron Islands. These data will provide a measure of the noise level in the system and incorporate predictive capacity for future monitoring programmes.

LOCALITIES: Lizard Island; Orpheus Island; Heron Island

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Heavy metals/Indicator species/Trophic levels/Pollution monitoring/Baseline studies/

[JAMESC023]

116 Physiology and ultrastructure of prokaryotic green algal symbionts from certain tropical ascidians.

PERIOD: January 1977 -

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

PROJECT LEADERS: Prof D.J. Griffiths (077) 814121
Dr T. Luong-Van (077) 814466

CONTACT OFFICER: Prof D.J. Griffiths

EXTERNAL SUPPORT: ARGS - $23,119 (1981 - 7225; 1982 - 8085; 1983 - 9309; 1984 - 8500)

OBJECTIVE

To investigate aspects of the growth and physiology of the *Prochloron* symbionts associated with various tropical ascidian species.

METHODOLOGY
Standard ultrastructural techniques.
Standard techniques for investigating photosynthetic characteristics.

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: *Prochloron* /Prochlorophyta/Symbionts/Plant physiology/Ultrastructure/

[JAMESC028]

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117 **Structure and function of sense organs in the banana prawn *Penaeus merguiensis* in relation to the animals behaviour.**

PERIOD: February 1979 -

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

PROJECT LEADER: Dr C.G. Alexander (077) 814282

EXTERNAL SUPPORT: ARGS - $5,600

OBJECTIVES
To identify and catalogue all external sense organs of *Penaeus merguiensis* .
To describe these in detail using electron microscopical techniques.
To investigate the physiological properties of these organs and relate them to the behaviour of the animal in determining how it responds to the physical environment (e.g. temperature, salinity changes) and the biological environment (e.g. food, animals of the opposite sex, potential predators).

METHODOLOGY
1. Video tape recording of animal's behaviour.
2. Optical and electron microscope examination of sense organs.
3. Electrophysiological recording of neural signals from sense organs.

STATUS
Parts (1) and (2) have produced significant results published in the journal : Marine Biology.

LOCALITY: Cleveland Bay

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: *Penaeus merguiensis* /Malacostraca/Sense organs//Behaviour/

[JAMESC042]

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118 **The importance of soft corals in reef ecology: a chemical and biological study.**

PERIOD: January 1980 - December 1984

ORGANIZATION: James Cook University of North Queensland
Department of Chemistry and Biochemistry
Post Office
Townsville, Qld 4811

PROJECT LEADER: Dr J.C. Coll (077) 814533

EXPENDITURE: $54,250 (this year), $100,000 (all years)

MANPOWER: 2.50 (this year), 10.00 (all years)

EXTERNAL SUPPORT: MSTGS

OBJECTIVE

The aim of this project is to determine the importance of soft corals in the marine ecosystem of the Great Barrier Reef, and to elucidate the machanisms by which they successfully compete for solid surfaces. In particular the project will examine the extent to which terpenoid secondary metabolites present in soft corals are important in defense against predators and effective as allelopathic agents in competition for space.

METHODOLOGY

Defensive studies involve ichthyotoxity assessments using *Gambusia affinis* the aqueous extracts of soft corals. Feeding deterrancy studies used *G. Affinis* . Interspecific competition was assessed in experiments involving relocation of colonies of alcyonacean soft corals among scleractinian coral and also alcyonacean corals were placed next to other alcyonacean colonies. Pure chemicals were used to confirm their toxicity against scleractinian corals

STATUS

The ichytoxicity of soft corals from the Townsville area was 50% toxic. The same result was found from Lizard Island corals and in a separate study, from Heron Island corals. About 80-90% of all soft coral extracts have detectible feeding deterrancy which is not correlated with toxicity. Some soft corals use allelopathy and are superior competitors with scleractinian corals. Others do not use allelopathy and appear to be inferior competitors. Soft corals move over hard corals, and leave elaborate trails.

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

Dr Paul Sammarco of AIMS is an active collaborator in the project in as much as it compliments his other Institute based research activities. He is a full author on most of our publications - often first author in this field.

GEOGRAPHIC REGION: R

SHIP TIME REQUIREMENTS: 6 days/year/plus time of AIMS trips 18 days/year.

MAJOR DESCRIPTORS: Terpenes/Alcyonacea/Anthozoa/Defence mechanisms/Chemical analysis/

[JAMESC045]

119 **The ultrastructure of scleractinian corals under normal and stress conditions.**

PERIOD: April 1981 - April 1984

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

PROJECT LEADERS: Dr C.G. Alexander (077) 814282
Dr J.D. Collins (077) 814144
Mr P. Harrison (077) 814883

CONTACT OFFICER: Dr C.G. Alexander

EXTERNAL SUPPORT: Commonwealth Postgraduate award - $686

OBJECTIVE

To characterise and describe the basic histomorphology and ultrastructue of selected scleractinian corals under normal conditions. The information will serve as a base-line for comparison of corals subject to stress and pollution regimes.

METHODOLOGY

1981 - literature review, collection of corals, fixation trials, histology and electron microscopy to describe normal coral tissue structure. Preliminary stress experiments.
1982 - 4 detailed stress experiments.

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: Anthozoa/Histology/Ultrastructure/Baseline studies/Pollution effects/

[JAMESC041]

120* **Calcification mechanisms in corals.**

PERIOD: February 1980 -

ORGANIZATION: La Trobe University
Department of Zoology
Bundoora, Vic. 3083

PROJECT LEADER: Dr A.T. Marshall (03) 4792250 or (03) 4792279

EXPENDITURE: $2,000 (this year), $2,500 (all years)

MANPOWER: 1.30 (this year), 2.00 (all years)

OBJECTIVES

To determine the mechanisms of calcification in corals using electron probe X-ray microanalysis, electron microscopy and isotope techniques.
The effects of oil and heavy metal pollutants on these mechanisms will also be investigated.

STATUS

An initial description of coral ultrastructure has been made and preparation methods for X-ray microanalysis are currently being investigated.

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Calcification/Anthozoa/Oil pollution/Heavy metals/Pollution effects/

[LATROB004]

121* **Feasibility study, to elucidate the involvement of the neurosecreting system in ionic and osmotic regulation in bristleworms (Evrythoe complanata).**

PERIOD: August 1982 -

ORGANIZATION: La Trobe University
Department of Zoology
Bundoora, Vic. 3083

PROJECT LEADER: Dr A. Wright (03) 4792235

EXPENDITURE: $2,000 (this year), $2,000 (all years)

MANPOWER: 0.25 (this year), 0.25 (all years)

OBJECTIVE

To investigate the activity of the endocrine system in osmoregulation of E. complanata.

METHODOLOGY

Bristleworms are subjected to immersion in media of different sodium chloride concentration for varying lengths of time. Body-fluids are removed and analysed for sodium concentration and osmolality. The brain (head region) is removed and fixed for histological and histochemical examination.

STATUS

Only preliminary work has been done. Heads fixed and processed; some body fluids analysed but not very successfully because of difficulties in removing sufficient for methods of analysis.

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: *Evrythoe complanata* /Osmoregulation/Endocrinology/

[LATROB008]

122* **Ionic regulation in marine insects (Hermatobatidae).**

PERIOD: August 1980 -

ORGANIZATION: La Trobe University
Department of Zoology
Bundoora, Vic. 3083

PROJECT LEADER: Dr A.T. Marshall (03) 4792259 or (03) 4792279

EXPENDITURE: $200 (this year), $400 (all years)

MANPOWER: 0.10 (this year), 0.20 (all years)

OBJECTIVE

To investigate physiological mechanisms of ionic and osmotic regulation in marine insects (Heteroptera : Hermatobatidae).

METHODOLOGY

Preliminary work on the nature of the regulatory organs and tissues is being done by electron microscopy.

STATUS

These insects present peculiar problems for both electron microscopy and physiological investigation by virtue of their extremely hydrophobic cuticle and their small size. Methods of dealing with these problems are being developed.

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Hermatobatidae/Insecta/Osmoregulation/

[LATROB005]

123 Algal calcification.

PERIOD: March 1971 -

ORGANIZATION: Murdoch University
Environmental and Life Sciences
Murdoch, W.A. 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.

GEOGRAPHIC REGIONS: R,X

MAJOR DESCRIPTORS: Algae/Coral reefs/Calcification/Photosynthesis/

[MURUNI012]

124 Cellular responses of marine phytoplankton to heavy metal stress.

ORGANIZATION: University of Melbourne
Marine Chemistry Laboratory,
Department of Inorganic Chemistry,
Parkville, Vic. 3052

PROJECT LEADER: Dr J.D. Smith (03) 3451844

MANPOWER: 1.00 (this year)

EXTERNAL SUPPORT: Great Barrier Reef Marine Park Authority

OBJECTIVE

To determine the effects of different forms of heavy metals on phytoplankton cellular metabolism. To elucidate the effects of heavy metal toxicity on selected biochemical pathways.

METHODOLOGY

Following element uptake using radiotracers, and by instrumental chemical analysis using atomic absorption spectrometry and energy dispersive x-ray spectrometry. Determination of element binding by gel chromatography and instrumental analysis. Investigation of metabolic processes by gas chromatography.

STATUS

In second year, methods established, preliminary results.

GEOGRAPHIC REGIONS: A,B,R

MAJOR DESCRIPTORS: Phytoplankton/Cells/Metabolism/Heavy metals/

[UNIMEL060]

125 **Ecological genetics of *Anadara trapezia* .**

PERIOD: January 1966 -

ORGANIZATION: University of New South Wales
School of Zoology
P.O. Box 1
Kensington, N.S.W. 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: *Anadara trapezia* /Bivalvia/Physiology/Biochemistry/Genetics/

[UNINSW019]

126 **Ascidiacea of the Great Barrier Reef: Morphological, biological, and chemical bases of inter- and intra- specific relationships.**

PERIOD: April 1984 -

ORGANIZATIONS: University of Queensland
Chemistry Department,
St Lucia, Qld. 4067

Queensland Museum
Gregory Terrace,
Fortitude Valley, Qld. 4006

PROJECT LEADERS: Prof. C.J. Hawkins (07) 3772384
Dr P. Mather (07) 522716

CONTACT OFFICER: Prof. C.J. Hawkins

EXPENDITURE: $29,000 (this year), $29,000 (all years)

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

EXTERNAL SUPPORT: MSTGS - $24,000
GBRMPA - $800

OBJECTIVE

To investigate the taxonomy of the Ascidiacea with special reference to the sub-order Aplousobranchia (the primarily colonial ascidians), to explore the relevance of certain aspects of their chemistry to proposed phylogenies, and to pursue systematic investigation of aspects of the chemistry of the Ascidiacea.

METHODOLOGY

The taxonomic work will be carried out at the Qld Museum with preserved specimens and work with fresh material at Heron Island.
The three main chemical aspects involve: (1) the presence of metals, in particular the presence and oxidation state of vanadium; determined by atomic absorption and e.s.r. spectroscopy.
(2) Isolation and purification of the major chromogens from the blood cells of a number of species from the 3 sub-orders and determination of their structures using hplc, ^{1}H and ^{13}C nmr, UV-Visible and circular dichroism techniques. The amino acids will be analysed by hplc.
(3) Isolation of biologically active molecules, didemnins.

STATUS

The major organic pigment (chromogen) has been isolated from a number of species from the three-sub-orders and these show differences from species to species. The study of the presence of vanadium and oxidation state has been extended to a larger number of species to further clarify the phylogeny of higher taxa.

LOCALITY: Heron Island

GEOGRAPHIC REGIONS: R,Q

MAJOR DESCRIPTORS: Ascidiacea/Blood cells/Metal-organic complexes/Bioaccumulation/

[UNIQLD051]

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127 **Electrophysiology and behaviour of sponges and anthozoans.**

PERIOD: January 1983 -

ORGANIZATION: University of Queensland
Heron Island Research Station,
via Gladstone, Qld 4680

PROJECT LEADER: Dr I.D. Lawn (079) 781399

EXPENDITURE: $45,395 (this year), $60,542 (all years)

MANPOWER: 0.33 (this year), 0.66 (all years)

EXTERNAL SUPPORT: ARGS - $49,883

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.
Electrophysiological 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.

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Porifera/Anthozoa/Electrophysiology/Behaviour/Nervous system/

[UNIQLD050]

128* Metal complexes in the blood of local ascidians.

PERIOD: January 1978 - December 1983

ORGANIZATION: University of Queensland
Chemistry Department
St. Lucia, Qld 4067

PROJECT LEADERS: Prof. C.J. Hawkins (07) 3772384
Mr D. Parry (07) 3772484

CONTACT OFFICER: Prof. C.J. Hawkins

EXPENDITURE: $25,660 (this year), $125,222 (all years)

MANPOWER: 1.50 (this year), 8.50 (all years)

EXTERNAL SUPPORT: ARGC - $85,622

OBJECTIVES

(1) To isolate the major compounds from the blood cells of ascidians
(2) To compare these compounds in the blood of ascidians of different sub-orders
(3) To study the chemistry of complexes, including metal sulfur compounds, found in the morula cells and formed *in vitro* in an attempt to determine their function within the morula cells.
(4) Determination of oxidation states of vanadium in different species of ascidians.

METHODOLOGY

The organic pigment is isolated from the morula blood cells by precipitating the compound from an acid lysate.
The pigment has been characterised by UV/VIS, CD, ^{13}C and ^{1}H n.m.r., e.s.r., GC/MS and micro-analysis.
The iron sulfide cluster formed by reduction of sulfate by the pigment in the presence of iron has been characterised by Mossbauer, e.s.r. and V.T. magnetic susceptibility. Oxidation states of vanadium are determined by e.s.r. spectroscopy.

STATUS

The major organic pigment from *Pyura stolonifera* has been isolatd and purified. The complete structure has not been determined as yet, it has the formula $[(C_{22}H_{34}N_7O_{15})\text{-}CH_3CO_2]_8$ with a molecular weight of 5200. It is a glucopeptide with a nitrogen heterocycle attached. The pigment is a strong reducing agent which forms an iron sulfide cluster complex. Preliminary studies of pigments in other species of ascidians have shown that they have similar structural features but contain important differences from species to species.
The study of vanadium in the ascidians has clarified the phylogeny of higher taxa and demonstrated a basic difference in oxidation state of intracellular vanadium in the two suborders (Aplousobranchia and Phlebobranchia).
Studies on the respiratory system of *P. stolonifera*) show that it can survive for days in anaerobic conditions and the electron transfer system does not contain normal cytochromes, and is not inhibited by cyanide, rotenone, amytal and antimycin.

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,Q

MAJOR DESCRIPTORS: Ascidiacea/Blood cells/Metal-organic complexes/

[UNIQLD034]

129 Pharmacology and pathology of ciguatera poisoning in mammals and studies on the possible effects of ciguatoxin on fish.

PERIOD: June 1983 - June 1986

ORGANIZATIONS: University of Queensland
Department of Physiology and Pharmacology
St. Lucia, Qld 4067

Princess Alexandra Hospital
Wolloongabba, Brisbane 4102

PROJECT LEADERS: Dr M.F. Capra (07) 3773120
Dr J. Cameron (07) 2216081

CONTACT OFFICER: Dr M.F. Capra

EXPENDITURE: $40,284 (this year)

MANPOWER: 2.50 (this year)

EXTERNAL SUPPORT: FIRTA - $16,300
MSTGS - $23,984

OBJECTIVE

(1) Isolation and purification of ciguatoxin (CTX) from toxic fish. (2) Testing the hypothesis that CTX as a fundamental action, causes the opening of Na^+ channels in excitable tissues. (3) An examination of the electrophysiological and neuropathological effects of CTX on mammalian nerves. (4) An assessment of functional and structural damage to peripheral nerves in the victims of CTX intoxication. (5) Examination of the effects of CTX on excitable membranes in "carrier" and "non-carrier" species of fish.

METHODOLOGY

CTX will be extracted and purified by the method of Tachibona developed at University of Hawaii. Standard neurological tests of nerve conduction (velocity, latency, sub and super normality) will be performed on laboratory mammals, fish and man. Structural changes in nerves will be assessed by light and electronmicroscopy. ^{22}Na efflux studies will be used to examine the action of CTX on Na channels.

STATUS

Ciguatoxin has been extracted from toxic reef fish. Purified toxin has been used in pharmacological experiments in intact rats. Sub-lethal doses of ciguatoxin alter a number of sensory nerve conduction parameters (conduction velocity, latency, refractoriness and supernormality). The action of ciguatoxin on the supernormal period indicates that this toxin acts on Na^+ channels to increase their opening time.

GEOGRAPHIC REGIONS: C,R,Q

MAJOR DESCRIPTORS: ,Pharmacology/Pathology/Poisons (biological)/Ciguatoxins/Nervous system/

[UNIQLD031]

130* **Toxinology of certain marine natural products.**

PERIOD: January 1983 - December 1983

ORGANIZATION: University of Queensland
Department of Physiology and Pharmacology
St. Lucia, Qld 4067

PROJECT LEADER: Dr M.F. Capra (07) 3773120

EXPENDITURE: $300 (this year), $500 (all years)

MANPOWER: 0.50 (this year), 1.00 (all years)

OBJECTIVE

To investigate the pharmacological actions of a series of terpenes isolated from soft coral by the staff of the James Cook University Chemistry Department. To conduct a preliminary study of the effects of tetrodotoxin, palytoxin and ciguatoxin on fish nerves.

METHODOLOGY

Terpenes are screened for actions on nerve conduction, neuromuscular transmission, vascular and gut smooth muscle activity in laboratory rats and toads. A fish nerve preparation will be used to assess the actions of tetrodotoxin, palytoxin and ciguatoxin. Parameters, including latency, conduction velocity, supernormality and subnormality will be measured.

STATUS

The studies on terpenes are nearing completion and nerve studies on fish have only just begun.

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

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Pharmacology/Poisons (biological)/Ciguatoxins/Terpenes/Nervous system/

[UNIQLD028]

131 **Control substances in symbioses between algae and invertebrates.**

PERIOD: January 1983 - December 1985

ORGANIZATION: University of Sydney
School of Biological Sciences,
Sydney, N.S.W. 2006

PROJECT LEADER: Dr R.T. Hinde (02) 6924035

EXPENDITURE: $19,600 (this year), $29,450 (all years)

MANPOWER: 1.30 (this year), 1.95 (all years)

EXTERNAL SUPPORT: ARGS - $38,200

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. Transmission electron microscopy and freeze-fracture.
2. $NaH^{14}CO_3$ as tracer of rates and products of photosynthesis, rates of translocation of photosynthate from plant to animal cells, and the nature of compounds translocated.
3. Bioassays for HRF activity and studies of the physiology of HRF-simulated translocation.
4. Chromatography, 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 an unidentified zoanthid (Australian Museum deposit no. G15210) and its zooxanthellae.
2. The levels of HRF activity in the hard coral *Plesiastrea versipora* , in the zoanthid and in *Pt. ianthina* .
3. The effectiveness of crude preparations of HRF from each of these animal species against zooxanthelae of the others.
4. A bioassay for HRF activity *in vivo* and *in vitro* in these three symbioses.
5. The approximate size of the active compound(s).

LOCALITIES: Sydney; One Tree Island

GEOGRAPHIC REGIONS: N,R

MAJOR DESCRIPTORS: Invertebrata/Algae/Symbiosis/Metabolites/Biochemical analysis/

[UNISYD039]

132 Ecophysiological and nutritional aspects of symbioses between algae and invertebrates, and between chloroplasts and molluscs.

PERIOD: June 1982 - June 1986

ORGANIZATIONS: University of Sydney
School of Biological Sciences
Sydney, N.S.W. 2006

Murdoch University
School of Environmental and Life Sciences,
Murdoch W.A. 6150

PROJECT LEADERS: Ms F. Pironet (02) 6924035
Dr R.T. Hinde (02) 6924035
Dr M.A. Borowitzka (09) 3322211

CONTACT OFFICER: Dr R.T. Hinde

EXPENDITURE: $12,199 (this year), $33,864 (all years)

MANPOWER: 1.09 (this year), 2.54 (all years)

EXTERNAL SUPPORT: MSTGS - $38,436 (Chloroplast symbiosis, supported 1976-1981)

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

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, is being studied. Attempts to isolate the algal symbionts in a viable state and to bring them into culture are underway. The

ultrastructure of *O. spongeliae* and its location within the sponge have been described.

LOCALITY: Sydney
GEOGRAPHIC REGIONS: R,N
MAJOR DESCRIPTORS: Invertebrata/Algae/Symbiosis/Photosynthesis/Physiology/

[UNISYD010]

133 Light-harvesting pigment-proteins of algae.

PERIOD: January 1974 - December 1983
ORGANIZATION: University of Sydney
School of Biological Sciences
Sydney, N.S.W. 2006
PROJECT LEADERS: Dr A.W.D. Larkum (02) 6922277
Dr R.G. Hiller (Macquarie University)
Dr R.McC. Lilley (University of Wollongong)
CONTACT OFFICER: Dr A.W.D. Larkum
EXPENDITURE: $20,000 (all years)
MANPOWER: 3.00 (all years)
EXTERNAL SUPPORT: ARGS - $14,500 (Grant to Dr R.G. Hiller and A.W.D. Larkum)

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

In red algae excitation energy is distributed from phycobilins to both photosystems. Two major chlorophyll *a* - protein complexes have been found which correspond with photosystem 1 and photosystem 2 respectively. In *Pavlova lutheri* (Prymnesiophyceae) a new chlorophyll *a* + c protein complex has been discovered.

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,Q,N
MAJOR DESCRIPTORS: Algae/Photosynthetic pigments/Proteins/Plant physiology/

[UNISYD009]

134* **Nitrogen fixation on a coral reef.**

PERIOD: January 1979 - December 1985

ORGANIZATION: University of Sydney
School of Biological Sciences,
Building A12,
Sydney N.S.W. 2006

PROJECT LEADER: Assoc. Prof. A.W.D. Larkum (02) 6923369

EXPENDITURE: $44,000 (this year), $113,000 (all years)

MANPOWER: 2.20 (this year), 7.20 (all years)

EXTERNAL SUPPORT: MSTGS - $104,000

OBJECTIVES

To assess the role of cyanobacteria in providing significant amounts of dissolved nitrogen nutrients to the waters of a coral reef.
To assess the importance of various areas of a coral reef to nitrogen fixation.
To investigate the effects of depth, season and other factors.
To identify the organisms involved and to study them in laboratory culture.

METHODOLOGY

Nitrogen fixation is follwed by the acetylene reduction technique in small incubation chambers using individual algae or small blocks of substratum.

STATUS

Nitrogen fixation has been found in a number of algal communities of One Tree Reef. Such communities are dominated by cyanobacteria but not all are hetercystons. Significant nitrogen fixation has also been found associated with larger benthic algae such as *Laurencia obtusa* .

LOCALITY: One Tree Island

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Nitrogen fixation/Bacteria/Coral reefs/Abiotic factors/

[UNISYD022]

135 **Prokaryotic algal symbionts on a coral reef.**

PERIOD: January 1984 -

ORGANIZATION: University of Sydney
School of Biological Sceinces,
Building A12,
Sydney, N.S.W. 2006

PROJECT LEADER: Assoc Prof A.W.D. Larkum (02) 6923369

EXPENDITURE: $7,000 (this year), $7,000 (all years)

MANPOWER: 1.30 (this year), 1.30 (all years)

EXTERNAL SUPPORT: ARGS - $7,000 (Grant to A.W.D. Larkum and G.C. Cox.)

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 curved to other prokaryotic algae in certain of these ascidians. The algae are similar to the previously described synechocystis trididemnae. The contain novel

phycobiliproteins (Cox, Hiller and Larkum, in press). Probably identical algae have been found in some crustose sponges.

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Ascidiacea/Algae/Symbionts/Coral reefs/

[UNISYD047]

See also: 28, 31, 67, 70, 170

136 Mangroves: Major Program.

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

PROJECT LEADER: Dr K. Boto (077) 789233

CONTACT OFFICERS: Dr D.W. Kinsey (077) 789377 (External Collaborations)
Dr J.C. Andrews (077) 789377 (Research)

EXPENDITURE: $1,165,000 (this year)

MANPOWER: 3.98 (this year)

OBJECTIVES

1. To complete surveys of forest distribution and structure by studies of three Gulf of Carpentaria systems; the Ducie-Wenlock, Norman and Macarthur Rivers.
2. To examine changes in forest structure with time along with biotic and abiotic controls on such changes by: (a) Continuation and completion of numerical classificatory analyses of survey data from (1). (b) Initiation of data collection and mathematical model development in relation to forest succession with particular interest in the effects of severe disturbances. (c) Initiation of field experiments to investigate species-specific effects of shade tolerance, tidal inundation and predation of initial seeding survival and subsequent growth.
3. To continue and expand studies of soil factors and their contribution to geographic variations in primary production by: (a) Foliar survey data in conjunction with (1) with emphasis on defining iron/ manganese deficiencies by correlation with laboratory experiments. (b) Extension of laboratory investigations in the interaction between substrate aneorobiosis and nitrogen nutrition with emphasis on short-term ^{15}N labelling experiments.
4. To collate data crucial to the understanding and modelling of *in-situ* system responses and adaptation to natural microclimate and salinity forcing functions by: Measurements of field photosynthetic response over a wide range of species and conditions.
5. To estimate the potential trophic significance of dissolved materials fluxes in a tidally-dominated mangrove system by using data arising from: (a) Numerical analysis of the data base resulting from the 1983/84 tidal cycle sampling program (12 months) in Coral Creek with major emphasis on seasonal variation in net flux vectors. (b) Chemical characterisation of the dissolved organic matter (DOM) with particular interest in the labile low molecular weight components of the DOM and in polyphenolics.

STATUS

A detailed set of "Projected Research Activities" 1984/85 is available on application to the Austrlian Institute of Marine Science.

CO-ORDINATION WITH OTHER PROJECTS

Dr. P. Saffigna (Griffith University); Prof. G.N. Richards & Dr. M. Nielson (James Cook University); Dr. N. Polunin (University of Papua New Guinea); UNESCO and United Nations University.

GEOGRAPHIC REGIONS: R,C,Y

SHIP TIME REQUIREMENTS: 10 + small boats.

MAJOR DESCRIPTORS: Coastal zone management/Mangrove swamps/Community composition/Ecosystems/

[AIMS--001]

137 Microbial Ecology on a Coral Reef: Workshop.

PERIOD: July 1984 -

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

PROJECT LEADER: Dr C. Wilkinson (077) 789211

EXPENDITURE: $30,000 (this year)

MANPOWER: 2.00 (this year)

EXTERNAL SUPPORT: National Science Foundation U.S.A. - $20,000 (US Dollars; Under US/Australia Science and Technology Agreement.)

OBJECTIVES

An intensive study of coral reef microbial ecology with the specific objectives to elucidate:
1. Temporal and spatial variations in microbial populations and productivity on a coral reef.
2. The sources of nutrition for these microorganisms and the role that microorganisms play in carbon cycling in coral reef ecosystems.
3. The effects of microbial populations on remineralisation and biogeochemical processes in sediments, on surfaces and within the fluid environment.
4. The trophic role of microorganisms in coral reef ecosystems and the major consumers of microorganisms.

METHODOLOGY

The Microbial Ecology on a Coral Reef Workshop was an interdisciplinary study involving 35 investigating scientists. Davies Reef was chosen as a dedicated field site and research revolved around a central week of discussion in a period of seven weeks. Research groups investigated water Movements, Microbial Biomass and Productivity, Materials Budgeting, Nitrogen Budgeting, Detrital and Mucus Consuption and Conversion, Water Column Trophodynamics, Benthic Trophodynamics and Anoxic Biogeochemical Processes.

STATUS

Field work completed, interim reporting in progress.

GEOGRAPHIC REGION: R

SHIP TIME REQUIREMENTS: 49 ship days

MAJOR DESCRIPTORS: Coral reefs/Ecology/Micro-organisms/

[AIMS--007]

138 Reef Ecology: Major Program.

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

PROJECT LEADER: Dr R. Bradbury (077) 789382

CONTACT OFFICERS: Dr D.W. Kinsey (077) 789377 (External Collaborations)
Dr J.C. Andrews (077) 789377 (Research)

EXPENDITURE: $2,119,000 (this year)

MANPOWER: 6.17 (this year)

OBJECTIVES

1. Biogeography and taxonomy. To complete publication of the general book "Corals of Australia and the Indo- Pacific", to continue work on Indian Ocean Corals, to establish biochemical genetic correlates of current coral taxonomy and to initiate the first intensive study of sponge taxonomy on the Great Barrier Reef.
2. Patterns over ecologically significant spatial scales. To conclude the characterization of assemblages in terms of major groups (hard corals, soft corals, fishes, crinoids, holothurians, sponges, macroalgae, benthic life forms) over micro-scales (between reef zones but within a reef) and meso-scales (between reefs, but within the cross-shelf transect), to initiate a

broad-scale survey of benthic life forms over micro- and meso-scales, and to supplement these with restricted macro-scale studies of coral distributions in the Indo-Pacific and fish and coral distributions down the length of the GBR.
3. Patterns over ecologically significant temporal scales. To continue studies at micro- scales (months to years) and to initiate studies at mesco-scales (years to tens of years) and macro-scales (tens of hundreds of years) of coral reef communities.
4. Factors determining and changing communities. To establish field experiments on major biotic factors (predation, grazing competition, symbiosis) and on major abiotic factors (light, sediments, and if possible hydrodynamic forces) suggested by earlier pattern characterization studies.
5. Explanatory models of system structure. To generate preliminary models of gross system structure to explain the known patterns and factors.
6. Predictive models of system dynamics. To generate preliminary models of gross system dynamics which predict the response of the system to perturbations.

STATUS

A detailed set of "Projected Research Activities" 1984/85 is available on application to the Australian Institute of Marine Science.

CO-ORDINATION WITH OTHER PROJECTS

Dr. D.G. Green (Australian National University)

GEOGRAPHIC REGIONS: R,P,I

SHIP TIME REQUIREMENTS: 245

MAJOR DESCRIPTORS: Coral reefs/Community composition/Abundance/Anthozoa/Distribution/

[AIMS--002]

139 Reef Metabolism: Major Program.

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

PROJECT LEADER: Dr D.J. Barnes (077) 789236

CONTACT OFFICERS: Dr J.C. Andrews (077) 789377 (Research)
Dr D.W. Kinsey (077) 789377 (External Collaborations)

EXPENDITURE: $1,776,000 (this year)

MANPOWER: 5.53 (this year)

OBJECTIVES

1. Community Productivity and Calcification. Preliminary data for primary production and calcification in backreef areas of Pandora, Rib, Myrmidon and Flinders Reefs. Long term patterns in community productivity and calcification. To be conducted at Lizard Island Research Station to complement data collected in 1974-76. Processing data and writing up results for seasonal light response curves and resulting integrated production and calcification rates by areas across the shallow reef flats of Rib and Myrmidon Reefs. Preliminary extension of these studies to Bowl and an additional mid-shelf reef. Use of *in-situ* respirometers for surveys of primary production and calcification by corals on the fore-reef slopes of these reefs for eventual integration of individual rates across communities.
2. Primary Productivity and Calcification in selected organisms. Conclusion of field work at Pandora Reef toward modelling the effect of light (depth) and temperature on primary production in hard corals. Analysis of data gathered last year for corals at Rib and Myrmidon Reefs. Completion of a mathematical model of the relationship between enviromental light and primary production by hard corals. Extension of the model to data on primary production by photosynthetic sponges. Most of this time will be devoted to data analysis and the preparation of publication in *Halimeda* and modelling light fields affecting primary productivity *in situ* . 3. Organic Carbon in Reef Waters. Continuing

quantitative studies of organic carbon in reef waters will focus on three major objectives: (a) imports and exports of total organic carbon at transect reefs and fluxes within reef zones will be determined, (b) the major classes or organic carbon components flowing across reef flats will be characterized and the metabolic fluxes determined, and (c) the heterotrophic potentials of organic carbon metabolism based on extracellular enzyme analyses will be determined concurrently with measurements of total organic carbon and measurement of reef-flat primary production and calcification. These measurements of organic carbon and carbon flux along with measurements of community primary production and calcification are central to the construction of a total carbon budget for coral reefs. Determination of the distribution of microbial biomass and of community structure in reef waters (initial studies). Use of experimental enclosures and flume chambers to estimate the importance of particulate carbon (microbial size classes) in the nutrition of filter feeding reef invertebrates. Preliminary study of size retention efficiencies and the effect of current speed on the retention efficiences of filter feeding invertebrates.
4. Long Term Coral Growth and Calcification. To study growth and calcification in major reef building corals with special reference to the following spatial and temporal scales: (a) growth and calcification in 10-30 years old corals from AIMS transect reefs, (b) growth, calcification rates and climatic records from 500-1000 year old colonies from the GBR, and (c) measurement of terrestrial inputs to the inshore shelf region of the GBR using fluorescent banding in *Porites* colonies. 5. Nutrient Fluxes with emphasis on Phosphorus. Studies to determine the fluxes and chemical composition of dissolved and particulate organic phosphorus in the reefs of the central Great Barrier Reef. Specifically, field studies of the fluxes of dissolved and particulate organic phosphorus in water moving across reef flats and its relationship to fluxes of carbon and other nutrients. Field and laboratory studies of phosphorus fluxes in unconsolidated reef sediments. Laboratory studies for the isolation and characterization of the chemical composition of organic phosphorus compounds isolated from reef waters.

STATUS

A detailed set of "Projected Research Activities" 1984/85 is available on application to the Australian Institute of Marine Science.

CO-ORDINATION WITH OTHER PROJECTS

University of Melbourne; Australian National University, UCLA.

GEOGRAPHIC REGION: R

SHIP TIME REQUIREMENTS: 193

MAJOR DESCRIPTORS: Coral reefs/Ecosystems/Nutrient cycles/Primary production/Energy flow/

[AIMS--005]

140 Shelf Seas: Major Program.

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

PROJECT LEADER: Dr J.C. Andrews (077) 789295

CONTACT OFFICER: Dr D.W. Kinsey (077) 789377 (External Collaborations)

EXPENDITURE: $1,725,000 (this year)

MANPOWER: 4.60 (this year)

OBJECTIVES

1. To study the large-scale occurrence of upwelling and the fate of advected water bodies within the Central Study Area, and to construct mathematical models towards understanding the mechanisms involved and predicting occurrences of upwelling.
2. To study the occurrence of topographically-generated upwellings and the fate of patches of shelf break water advected through the reef matrix. In particular to conduct field experiments focussing on:
(a) Mesoscale vortices generated by the boundary current in the Central Study Area.

(b) Tidally- induced vortices behind narrow reef passages in the northern GBR.
3. To determine the responses of selected benthic communities to periodic nutrient supplies involving:
(a) A 1-year intensive series of laboratory studies of the growth rate of *Halimeda* in response to controlled nutrient levels, temperature and irradiance.
(b) Field studies of the spatial distribution of *Halimeda* and associated sediments particularly behind narrow reef passages in the northern GBR (see 2b).
(c) The experimental phase of a time-series study of the degree of coherence of alternations in rates of reef metabolism with wind-driven bottom intrusions. (Secondary objectives are to estimate seasonal changes in reef flat metabolism and to estimate the gas velocity transfer coefficient in an open water system).
4. To study phytoplankton dynamics within the Shelf Sea in relation to light, temperature and nutrient levels, with focus on:
(a) Measurement of phytoplankton growth and primary production rates using *in-situ* diffusion cultures and ^{14}C uptake methods.
(b) Establishing the methodology for determining rates of nitrogen cycling in Shelf Sea waters using ^{15}N stable isotope labelling and measurement by emission spectrometry.
5. To study dispersal and recruitment of selected reef dwelling animals with focus on:
(a) Settlement patterns of juvenile corals on artificial habitats around an isolated reef in the Central Study Area, towards determing the degree to which reefs are connected, both to each other and to the Shelf Sea.
(b) The spatial and temporal abundances of zooplankton and of larval fish in the Central Study Area, *per se* and in relation to lower levels in the marine food chain.
(c) Patterns in the recruitment of larval fish to reef environments from the norther (14°S) to the southern (24°S) GBR.

STATUS

A detailed set of "Projected Research Activities" 1984/85 is available on application to the Australian Institute of Marine Science.

CO-ORDINATION WITH OTHER PROJECTS

James Cook University of North Queensland; Great Barrier Reef Marine Park Authority; Griffith University; University of Sydney.

GEOGRAPHIC REGION: R

SHIP TIME REQUIREMENTS: 177

MAJOR DESCRIPTORS: Shelf dynamics/Upwelling/Nutrients (mineral)/Production (biological)/Coral reefs/

[AIMS--003]

141 The Nearshore Environment: Major Program.

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

PROJECT LEADER: Dr D.W. Kinsey (077) 789242

CONTACT OFFICER: Dr J.C. Andrews (077) 789377 (Research)

EXPENDITURE: $979,000 (this year)

MANPOWER: 2.73 (this year)

OBJECTIVES

1. For the Bowling Green Bay/Burdekin River outfall system: To develop a full annual cycle for primary production, total community carbon consumption, trophic balance, standing stocks of organic matter, microbial biomass, organic and inorganic phosphate levels; to identify organic and inorganic phosphate levels; to identify organic source tracers; to establish a basic mathematical model for circulation; to attempt to calculation of diel, seasonal and annual fluxes for all parameters studied; to study key processes in microbial decomposition.
2. For the Northern Rivers systems: To carry out a one month detailed study of the wet

season patterns in the Port Musgrave (Wenlock- Ducie) system considering those ecological parameters covered by objective 1 and suitable parameters of physical flow and mixing; to consider in brief, by excursions during the one month period, the wet season patterns in the Escape River and Norman River systems; to continue analytical examination of dry season materials taken during the 1983/84 Northern Rivers trip.
3. To complete the development of equipment, facilities and expertise to allow the consideration of physical phenomena associated with shallow water over variable-slip muddy bottom.

STATUS
A detailed set of "Project Research Activities" 1984/85 is available on application to the Australian Institute of Marine Science.

CO-ORDINATION WITH OTHER PROJECTS
Dr. M. Heron, James Cook University of North Queensland; Dr. T. Torgersen, Australian National University; Dr. B. Johns, University of Melbourne; Dr. J. Chappell, Australian National University.

GEOGRAPHIC REGIONS: R,C
SHIP TIME REQUIREMENTS: 68
MAJOR DESCRIPTORS: Coastal zone management/Primary Production/Biomass/Nutrient cycles/Nearshore circulation/

[AIMS--004]

142* Biogeography and ecology of northern Great Barrier Reef Islands.

PERIOD: February 1979 - December 1983
ORGANIZATION: Australian Mineral Development Laboratories
ASPECT Environmental Consultants
P.O. Box 114
Eastwood, S.A. 5063
PROJECT LEADER: Dr R.C. Buckley (08) 791662
EXPENDITURE: $100,000 (all years)
MANPOWER: 0.08 (this year), 1.50 (all years)
EXTERNAL SUPPORT: Australian Institute of Marine Science (Boat time and facilities 2 months, 1979.)
CSIRO (Research fellowship Dr Buddey, 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
All field work completed, writing up 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.

CO-ORDINATION WITH OTHER PROJECTS

Data provided to Qld National Parks and Wildlife Service and to Division of National Mapping as requested at intervals.

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Ecology/Biogeography/Islands/

[AMDEL-002]

143 Environmental and biological determination of isotope fractionation in components of coral symbioses.

ORGANIZATION: Australian National University
RSBS, Department of Environmental Biology,
P.O. Box 475
Canberra, A.C.T. 2601

PROJECT LEADER: Prof. C.B. Osmond

CONTACT OFFICER: Mr Z. Roksandic (062) 493547

OBJECTIVE

To investigate and possibly quantify the magnitudes of stable isotope fractionation in coral-zooxanthellae symbioses and use their signatures in skeletal carbonates as indicators of environmental conditions at the time of their incorporation.

METHODOLOGY

Initial collection of scleractinian specimens from different morphological habitats prepared by standard biochemical techniques suitable for determination by stable isotope ratio mass spectrometry.

STATUS

Very little evidence is available to successfully use stable isotopes of carbon and oxygen as indicators of variations in seasonal insulation and palaeoenvironmental conditions of corals, because they precipitate skeletal carbonate which is not in isotopic equilibrium with that of sea water. The major uncertainties in interpretation arise because they are influenced by biological processes, such as photosynthesis of their symbiont algae, and unless the magnitude and degree of contribution to and incorporation of that carbon into the skeletal carbonate is firstly resolved, it will be no useful tool in paleoenvironmental studies.

CO-ORDINATION WITH OTHER PROJECTS

Studies on Helemeda by AIMS.

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Coral reefs/Palaeoceanography/Scleractinia/Symbiosis/Sea water/

[ANU---015]

144 **Reproductive biology and post-nesting migration of the flatback turtle *Chelonia depressa* .**

PERIOD: November 1979 -

ORGANIZATION: Capricornia Institute of Advanced Education
Department of Biology,
Rockhampton, Qld 4700

PROJECT LEADER: Dr C.J. Parmenter (079) 361177 Ext 222

EXPENDITURE: $4,000 (this year), $11,500 (all years)

MANPOWER: 0.75 (this year), 2.05 (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

Four 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 Sevice.

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Chelonia/Population dynamics/Geographical distribution/Reproduction (biological)/

[CIAE--001]

145* **Ecology of oceanic fronts.**

PERIOD: July 1979 -

ORGANIZATION: CSIRO
Division of Fisheries Research
CSIRO Marine Laboratories
P.O. Box 21
Cronulla, N.S.W. 2230

PROJECT LEADER: Mr F.B. Griffiths (02) 5236222

EXPENDITURE: $24,200 (this year), $95,000 (all years)

MANPOWER: 2.00 (this year), 9.00 (all years)

OBJECTIVE

To provide information on the role of oceanic fronts in defining the composition, distribution, productivity, and interactions of pelagic and demersal communities. Particular attention has been paid to the mechanisms causing some animals to concentrate at fronts and others to avoid crossing frontal "barriers". A thorough understanding of the biological processes at fronts should help us to predict which types of fronts, under what conditions, will attract commercially important animals.

METHODOLOGY

To compare a wide variety of fronts. Initial efforts have focused on fronts associated with warm-core eddies off the east coast of Australia. The advantages of working near eddies are twofold: (a) eddies are readily identifiable semi-closed microcosms which may change biologically with age; and (b) eddies usually persist long enough so that they can be revisited with confidence and the same system can be quantitatively resampled.
Other oceanic fronts studied for comparison include a near surface coastal front off Shoalhaven Bight (February, 1979) and shelf break fronts along the southeast coast of Australia (April, 1981).

STATUS

Preliminary results in December, 1978 indicated that the species composition of fishes, crustacea and squid within eddy F was recognisably distinct from that in the surrounding water masses. These observations were expanded during a multidisciplinary time-series study of eddy J from July, 1979 through July, 1980. A further cruise is scheduled for September, 1981 (Soela SO4/81) to answer specific questions raised during previous eddy studies.
An international workshop on warm-core eddies is being scheduled for January, 1982 in Wellington, New Zealand. A number of publications are available from the project leader which describe the results in detail.

GEOGRAPHIC REGIONS: B,R,Q,N,T

MAJOR DESCRIPTORS: Ocean fronts/Production (biological)/Organism aggregations/Community composition/Distribution patterns/

[CSIRO-042]

146 Lobster larval distribution.

PERIOD: May 1979 -

ORGANIZATION: CSIRO
Division of Fisheries Research
CSIRO Marine Laboratories
P.O. Box 20
North Beach, W.A. 6020

PROJECT LEADER: Dr B.F. Phillips (09) 4471388

EXPENDITURE: $2,500 (this year), $30,500 (all years)

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

OBJECTIVES

To study the vertical movements and distribution of the macro-zooplankton associated with warm core eddies and oceanic fronts, especially in south-eastern Australian waters.
Special attention is being paid to crustacean species including the phyllosoma larvae of the Scyllaridae and Palinuridae (the slipper and rock lobsters) to examine mechanisms of dispersal and recruitment of these animals.

METHODOLOGY

Systematic sampling of the plankton using 50cm, opening and closing, bongo nets. This allows discrete samples at selected depths. These data are integrated with environmental information including light levels in the ocean. Part of this work involves the preparation of a guide to the phyllosoma larval stages present in the plankton of the waters around Australia.

STATUS

All field sampling has been completed and the data are being analysed and prepared for publication.

GEOGRAPHIC REGIONS: W,C,R,Q,N

MAJOR DESCRIPTORS: Zooplankton/Malacostraca/Larvae/Life history/Distribution patterns/

[CSIRO-015]

147 Studies on regional characteristics of fouling communities.

PERIOD: May 1977 - June 1985

ORGANIZATION: Department of Defence
Materials Research Laboratories
Post Office Box 50
Ascot Vale, Vic. 3032

PROJECT LEADER: Mr J.A. Lewis (03) 3193278

EXPENDITURE: $8,000 (this year), $128,000 (all years)

MANPOWER: 0.20 (this year), 4.20 (all years)

OBJECTIVE

To determine the species composition, seasonal variation in settlement, and patterns of development of macrofouling communities at sites of Defence interest.

METHODOLOGY

Studies implemented concurrently at HMAS STIRLING in Cockburn Sound, WA, Williamstown Naval Dockyard in Hobsons Bay, Vic, the North Barnard Is., Qld, and Christmas I. Black non-toxic panels immersed at each site as follows:
(a) a series of panels immersed for successive 1-month intervals to monitor seasonal variation in settlement, and
(b) a set of panels immersed at the start of each trial and single panels removed at set intervals for up to 3 years to monitor community development.
Caged panels also immersed at North Barnard Is. and Christmas I. sites.

STATUS

Panel exposures completed; panel assessment and data analysis continuing.

LOCALITY: Christmas Island

GEOGRAPHIC REGIONS: B,W,R,I

MAJOR DESCRIPTORS: Fouling organisms/Community composition/Settlement (biological)/Regional variations/

[DD----003]

148 Survey of communities around Triangular Island, Shoalwater Bay.

PERIOD: January 1981 - June 1985

ORGANIZATION: Department of Defence
Materials Research Laboratories
P.O. Box 50
Ascot Vale, Vic 3032

PROJECT LEADERS: Mr J. Lewis (03) 3193278
Mr J. Forsyth (03) 317222 (Ext 1776)

CONTACT OFFICER: Mr J. Lewis

EXPENDITURE: $20,000 (this year), $60,000 (all years)

MANPOWER: 0.50 (this year), 1.50 (all years)

OBJECTIVE

To document the composition, distribution and seasonal variation of marine communities inhabiting intertidal and just subtidal mudflats around Triangular Island.

METHODOLOGY

Four seasonal surveys with the following sampling;
(a) Fishes, by beach seine net on rising and falling tides during day and night.
(b) macrobenthic invertebrates, by core sampes along transects and across grids.
(c) macrobenthic plants, by general collection and quadrat harvesting.
(d) Zooplankton, by 333 μm mesh plankton net on rising and falling tides.

STATUS

Surveys completed in February, May and September 1981 and November 1982. Sample analyses continuing.

LOCALITIES: Shoalwater Bay; Triangular Island

GEOGRAPHIC REGION: R

SHIP TIME REQUIREMENTS: 16

MAJOR DESCRIPTORS: Littoral zone/Community composition/Distribution patterns/Seasonal variations/Mud/

[DD----001]

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149 **Census and population biology of the mud crab *Scylla serrata* in the narrows, central Queensland.**

PERIOD: March 1981 -

ORGANIZATION: Esso Australia Ltd
Coal & Synthetic Fuels Department,
Rundle Project Group,
127 Kent Street,
Sydney, N.S.W. 2000

PROJECT LEADER: Mr R.D. Tait (02) 2362187

EXPENDITURE: $5,000 (this year), $60,000 (all years)

MANPOWER: 0.30 (this year), 2.50 (all years)

OBJECTIVE

To establish baseline population estimates and population biology of the mud crab *Scylla serrata* in an area adjacent to the proposed Rundle oil shale project.

METHODOLOGY

Capture, mark, release and recapture (CMRR) techniques are employed at five locations on a bi-monthly basis to provide data for population estimates, growth, movement, and biology. Jacknife population estimates are used.

STATUS

All field work is complete from the five locations and analysis and report preparation are being carried out.

LOCALITY: Rundle

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Scyllaridae/Malacostraca/Population dynamics/Oil shale/Environmental impact/

[ESSO--001]

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150 **Mangrove litter fall as an estimate of the status of mangroves adjacent to the Rundle oil shale project.**

PERIOD: June 1981 -

ORGANIZATION: Esso Australia Ltd
Coal & Synthetic Fuels Department,
Rundle Project Group,
127 Kent Street,
Sydney, N.S.W. 2000

PROJECT LEADER: Mr R.D. Tait (02) 2362187

EXPENDITURE: $3,000 (this year), $25,000 (all years)

MANPOWER: 0.10 (this year), 1.00 (all years)

OBJECTIVE

To establish natural seasonal variation in litter production from various mangrove species in the narrows, central Queensland.

METHODOLOGY

One metre square litter traps were suspended under selected mangroves to collect litter fall. These traps were cleared every four weeks and the litter identified. Wet and dry weights were recorded for separate components.

STATUS

All field work complete and samples analysed. Analysis and report preparation under way.

LOCALITY: Rundle

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Mangrove swamps/Oil shale/Environmental impact/

[ESSO--003]

151 **Analysis of visually dominant organisms data from manta tow coral surveys.**

PERIOD: March 1983 - November 1983

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

James Cook University of North Queensland (Subcontract)
Department of Marine Biology
Post Office
Townsville, Qld 4811

PROJECT LEADERS: Dr W. Craik (077) 818811
Mr G. Bull (077) 814111

CONTACT OFFICER: Ms S. Driml (077) 818811

EXPENDITURE: $13,200 (all years)

MANPOWER: 0.80 (all years)

OBJECTIVE

To analyse data on visually dominant organisms collected in coral surveys.

METHODOLOGY

The consultant will undertake initial data analysis including basic descriptive statistics and preliminary cluster analysis. The results will then be discussed in a workshop of local coral specialists. It is intended that the workshop will recommend an approach for further analysis of the data. The consultant will then carry out full analysis using the recommended method.

STATUS

Report submitted to GBRMPA. Recommendations in the report were used to modify the technique.

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: Anthozoa/Dominant species/Data collections/Coral reefs/

[GBRMPA069]

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152 Annual survey of recruitment of selected reef species in selected habitats on Capricornia Reefs.

PERIOD: April 1983 - June 1984

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

University of Sydney (Subcontract)
Sydney, N.S.W. 2006

Griffith University (Subcontract)
Nathan, Qld 4111

PROJECT LEADERS: Dr W. Craik (077) 818811
Dr P.F. Sale (02) 6922222
Dr P. Doherty (07) 2757111

CONTACT OFFICER: Dr W. Craik

EXPENDITURE: $10,000 (this year), $10,000 (all years)

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

OBJECTIVE

To continue and expand a program monitoring recruitment of selected reef species in specified habitats on seven Capricornia reefs.

METHODOLOGY

Visual survey will be conducted of 7 Capricornia Section reefs; Wistari, Heron, Llewellyn, Fairfax, Lady Musgrave, One Tree, Fitzroy.
Replicate sites in 2 habitats at each reef (lagoonal patch reefs and leeward reef slopes) to 20-25' will be surveyed. Results will be calculated to give densities per 100 sq.m. for young of selected species seen. Four divers will survey 7 reefs in 10 days.
The following analyses will be undertaken:
1 - density differences between reefs of different species
2 - density differences between years of different species
3 - density differences between years of different reefs.

STATUS

Manuscript submitted to Oecologia.

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: 7 days

MAJOR DESCRIPTORS: Coral reefs/Community composition/Habitat/

[GBRMPA048]

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153 Aspects of community dynamics and biology of Scleractinian corals on the Heron Reef crest.

PERIOD: January 1982 -

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

University of Queensland (Subcontract)
Department of Zoology,
St. Lucia, Qld 4067

PROJECT LEADERS: Dr W. Craik (077) 818811
Ms A. Bothwell (07) 3771111

CONTACT OFFICER: Ms E. Eager (077) 818811

EXPENDITURE: $900 (this year), $2,643 (all years)

MANPOWER: 1.00 (this year), 2.00 (all years)

OBJECTIVE

To monitor and catalogue parts of a coral community in a long term study to provide information on temporal changes in recruitment, frequency and abundance of species etc.

METHODOLOGY

Over 40x1 m^2 quadrats have been established on the Heron Reef crest. The quadrats are in three groups, two in back reef locations and one to windward. A basic census is taken around August each year and involves making photographic records, additional higher resolution maps of species and individual colonies in order to characterise the demography of the community generally as well as of species populations.

STATUS

Interim reports submitted to GBRMPA. Field work and analyses continued in 1984.

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Scleractinia/Anthozoa/Population dynamics/Biological surveys/

[GBRMPA052]

154 Coral and Coral Trout Survey of the Far Northern Section of the Great Barrier Reef Marine Park.

PERIOD: March 1984 - December 1984

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

Sea Research

PROJECT LEADERS: Dr W. Craik (077) 818811
Dr A.M. Ayling (070) 986151

CONTACT OFFICER: Mr I.M. Dutton (077) 818811

EXPENDITURE: $47,000 (this year), $47,000 (all years)

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

OBJECTIVE

To survey coral, coral trout and crown of thorns starfish in the Far Northern Section of the Great Barrier Reef Marine Park.

METHODOLOGY

Coral trout *Plectropomus* spp. and *A planci* counts were made at each of 31 reefs using ten 50mx20m transects/reef and coral was surveyed using a standard manta tow technique.

STATUS

The study revealed that coral trout densities in this Section range from 20 to 60 per hectare. Only 45 crown of thorns starfish were seen on the 31 reefs.

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: 42 days

MAJOR DESCRIPTORS: *Plectropomus* spp./*Acanthaster planci* /Distribution patterns/Coral reefs/ Stock assessment/

[GBRMPA098]

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155 Coral Reef Metabolism and Calcification.

PERIOD: September 1983 - September 1984

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

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

PROJECT LEADERS: Dr W. Craik (077) 818811
Assoc Prof M. Pichon (077) 814111
Dr J. Morrissey (077) 814111

CONTACT OFFICER: Dr W. Craik

EXPENDITURE: $3,800 (all years)

OBJECTIVE

To obtain baseline data on coral reef metabolic and calcification rates to ascertain whether a coral reef contributes to the pool of organic matter in shallow water marine environments or whether it is a consumer of organic matter.

METHODOLOGY

Reef metabolism will be assessed by rates of oxygen production over daily cycles. Changes in oxygen concentration in waters flowing over the reef (upstream/downstream technique) will be measured by an oxygen polarographic electrode.
Calcification will be derived directly from changes measured in seawater total alkalinity (analyses by wet chemistry according to the method of Culbertson *et al* , 1979).

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/Metabolism/Calcification/

[GBRMPA102]

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156 Hereditary Structure and Genetic Exchange in Coral Populations.

PERIOD: January 1984 - December 1984

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

James Cook University of North Queensland (Subcontract)
Department of Marine Biology,
Post Office,
Townsville, Qld 4811

PROJECT LEADERS: Dr W. Craik (077) 818811
Mr A. Heyward (077) 814111
Mr R. Babcock (077) 814111

CONTACT OFFICER: Ms E. Eager (077) 818811

EXPENDITURE: $1,800 (this year), $1,800 (all years)

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

OBJECTIVE

To determine the degree of larval dispersal between reefs by documenting genetic variation within populations and genotypic frequency variation between separate populations.

METHODOLOGY

This study will investigate the genetic structure of populations of three species of coral, *Montipora ramosa* , *Goniastrea aspera* and *G. favulus* using a ten locus electrophoretic system. Preliminary studies have determined ten enzyme loci which show electrophoretic activity in corals. Sampling sites for the corals will be at Magnetic and Palm Islands.

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.

LOCALITIES: Magnetic Island; Palm Island

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Corals/Population dynamics/Larvae/Genetics/

[GBRMPA108]

157 Investigation into the relationship between breeding and feeding of seabirds around reef environments.

PERIOD: January 1983 -

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

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

PROJECT LEADERS: Dr W. Craik (077) 818811
Mr G.C. Smith (07) 2757111

CONTACT OFFICER: Ms E. Eager (077) 818811

EXPENDITURE: $900 (all years)

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

OBJECTIVE

To test if food is a limiting resource to reproductive output and chick growth in tropical seabirds. To test if weather, tides, inter-specific competition and prey availability affect consumption.

METHODOLOGY

Four species (bridled tern, lesser crested tern, crested tern, brown booby) will be examined in the Lizard Island area and Raine Island and the findings compared with data from Capricornia.
Field work will involve locating breeding pairs, mapping of nest distributions in colonies, collection of data for calculating breeding parameters, banding young, monitoring growth rates of chicks, monitoring feeding behaviour, establishing weather recording equipment. Experiments to investigate supplementary feeding and nestling number manipulation may be undertaken.

STATUS

Field work continued in 1984.

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Aves/Feeding/Food availability/Breeding/

[GBRMPA060]

158 Investigation of environmental and biological factors causing morphological variation in reef corals, *Pavona cactus* and *Turbinaria mesenterina* .

PERIOD: January 1983 - December 1983

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

James Cook University of North Queensland (Subcontract)
P.O. James Cook University, Qld 4811.

PROJECT LEADERS: Dr W. Craik (077) 818811
Ms B. Willis (077) 814111

CONTACT OFFICER: Dr W. Craik

EXPENDITURE: $353 (all years)

MANPOWER: 1.00 (all years)

OBJECTIVE

To elucidate growth and reproductive strategies of *Pavona cactus* and *Tubrinaria mesenterina* .

METHODOLOGY

Growth and reproductive data for *T. mesenterina* will be collected to complete a 2-year study of this species in Nelly Bay, Magnetic Island.
The growth over the past two years of two forms of *P. cactus* at Lizard Island Reef will be compared to test the hypothesis that fish grazing pressure is the selective agent responsible for the maintenance of polymorphism in this species.
Short term experiments where branches of the protective 'symbiotic' corals are removed to expose the tips and bases of the convoluted form of *P. cactus* will also be initiated.

STATUS

Report submitted to 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.

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: *Pavona cactus* / *Tubrinaria mesenterina*
/Anthozoa/Reproduction (biological)/Growth/

[GBRMPA062]

159 Metabolic Studies of the Crown of Thorns Starfish.

PERIOD: January 1984 - December 1984

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

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

PROJECT LEADERS: Dr W. Craik (077) 818811
Mr K. Peckham (077) 814111

CONTACT OFFICER: Ms E. Eager (077) 818811

EXPENDITURE: $800 (this year), $800 (all years)

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

OBJECTIVE

To determine the relationship between specific metabolic rate (SMR) and size in *Acanthaster planci* and the effects of nutritional status on SMR.

METHODOLOGY

Oxygen consumption will be used to measure metabolic rate. Wet and ash-free dry weights of pyloric caeca and gonads relative to total body weight will be used to measure nutritional status.

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: *Acanthaster planci* /Nutrition/

[GBRMPA111]

160 Planktonic Dispersal of Larval Coral.

PERIOD: November 1983 - July 1984

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

James Cook University of North Queensland
Post Office,
James Cook University,
Townsville, Qld 4811

PROJECT LEADERS: Dr W. Craik (077) 818811
Mr G. Bull (077) 814111

CONTACT OFFICER: Ms S. Driml (077) 818811

EXPENDITURE: $2,000 (this year), $19,232 (all years)

MANPOWER: 0.10 (this year), 0.50 (all years)

OBJECTIVE

To track the paths of coral larvae resulting from a mass spawning from site of origin to final settlement place.

METHODOLOGY

Observations at the selected reef began around the previously predicted date for mass spawning. Current drogues were released among the spawning corals and subsequently followed by small boats, with position fixing by radar from a mother ship. At regular intervals the water around the drogues was samples for the presence and abundance of coral eggs and larvae. Analsis of samples of seawater taken will reveal the abundance of larvae at sites around the reef and along the current track.

STATUS

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

GEOGRAPHIC REGION: R

SHIP TIME REQUIREMENTS: 8 days

MAJOR DESCRIPTORS: Larvae/Distribution patterns/Corals/

[GBRMPA087]

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161 Review of Beche-de-Mer (Holothurian) surveys.

PERIOD: June 1984 - July 1984

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,
Post Office,
Townsville, Qld 4811

PROJECT LEADERS: Dr W. Craik (077) 818811
Dr V. Harriott (077) 814111

CONTACT OFFICER: Ms E. Eager (077) 818811

EXPENDITURE: $1,675 (all years)

MANPOWER: 0.05 (this year), 0.10 (all years)

OBJECTIVE

To analyse data and review surveys on holothurians (beche-de-mer).

METHODOLOGY

The analysis of survey data collected by the then Qld. Fisheries Service will be completed. A report will be written outlining distribution and abundance, and reviewing census techniques and other relevant information.

STATUS

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

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Holothuroidea/

[GBRMPA103]

162 **Sudbury reef assessment.**

PERIOD: October 1984 - November 1984

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

PROJECT LEADER: Dr W. Craik (077) 818811

CONTACT OFFICER: Mr P. McGinnily (077) 818811

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

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

OBJECTIVE

To assess coral cover on this reef, which is the reef most heavy collected for coral on the Great Barrier Reef, as a baseline for future monitoring.

METHODOLOGY

Reef survey by manta towing.

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.

LOCALITY: Sudbury Reef

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Coral reefs/Ecology/

[GBRMPA090]

163 **Year to year variation of recruitment of juvenile hard corals on a reef front.**

PERIOD: April 1983 - December 1983

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

James Cook University of North Queensland (Subcontract)
Department of Marine Biology
Post Office
Townsville, Qld 4811

PROJECT LEADERS: Dr W. Craik (077) 818811
Dr C. Wallace (077) 814111

CONTACT OFFICER: Dr W. Craik

EXPENDITURE: $1,876 (all years)

MANPOWER: 0.10 (all years)

OBJECTIVE

To understand within and between year recruitment of corals to a reef. To test a simple method for monitoring coral recruitment on a continuing basis.

METHODOLOGY

In 1980-82, as part of a study of some dynamic aspects of a reef front coral community, a study was made of the recruitment of juvenile hard corals onto several parts of a reef front. The most significant recruitment was seen to occur during the summer months, but the summer of 1980-81 was apparently more "successful" for recruitment when compared with the summer of 1981-82, in which only approximately one-third of the 1980-81 numbers of

recruits were obtained.
Since the research site was visited for other research during the following summer period, 1982-83, another set of recruitment plates has been set down, so that the previous findings can be compared with those of a third year. The plates will be processed and examined and compared with the previous two sets of summer plates.

STATUS
Report submitted to GBRMPA and manuscript also submitted for 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

MAJOR DESCRIPTORS: Anthozoa/Coral reefs/Recruitment/Community composition/

[GBRMPA050]

164* **Analysis of variation between and within plant populations of introduced and naturally occurring plant populations on coral atolls.**

PERIOD: January 1981 - January 1984

ORGANIZATION: Griffith University
School of Science
Nathan, Qld 4111

PROJECT LEADERS: Ms E. Yeoman (07) 2757242 or (07) 3921579
Dr R.S. Holmes

CONTACT OFFICER: Ms L. Tabrett (07) 2757334

EXPENDITURE: $2,000 (this year), $2,000 (all years)

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

OBJECTIVES
1. To consider plant variation *per se* and relate this to the degree of interdependence of plant populations on each island for a greater understanding of conservation issues.
2. To monitor development of a weed species (*Cenchrus echinatus*) recently introduced to a number of islands in the Capricorn group in order to consider the effects of colonization at the ecological and genetic level.
3. To relate plant strategies to genotype in populations at various successional stages by classifying islands according to degree of vegetational development and degree of dominance of each species at each stage.
4. To relate phenological and demographic parameters to genetic theory of colonising species and current biogeographic predictions regarding island biology.

METHODOLOGY
In 1981, seed of 6 species was collected from a number of populations on the Swains Reef, Capricorn Islands and Chesterfield Islands. Basic ecological parameters such as degree of dominance, ground cover, co-occurring species and their density were measured. Seed collected will be used for glass house experiments for morphological and physiological variability. Seed will also be used for electrophoretic analysis of enzyme variation and to separate genotypes. Similar genetic analysis will be necessary for seed to be collected in 1982 and 1983.

STATUS
Currently, seed has been collected and basic ecological measurements made, initial tests of seed germination are being carried out in glasshouse facilities. Electrophoretic analyses will be commencing shortly.

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: Swains Reef; Capricorn Group
GEOGRAPHIC REGION: R
MAJOR DESCRIPTORS: Angiospermae/Population genetics/Colonization/Islands/Biogeography/

[GRIFFI001]

165 Population biology of the tropical gastropod *Strombus luhuanus* , and its resilience to human exploitation.

PERIOD: September 1980 -
ORGANIZATIONS: Griffith University
Australian Environmental Studies
Nathan, Qld 4111

CSIRO
Cleveland Marine Labs
Division of Fisheries
P.O. 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: $28,000 (this year), $63,000 (all years)
MANPOWER: 1.00 (this year), 2.50 (all years)
EXTERNAL SUPPORT: MSTGS - $27,403 (1984 only)

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. Strombid gastropods have been chosen for this purpose because they can be easily tagged, sexed, aged and experimentally manipulated, as well as living mainly in simply-structured shallow-water habitats.

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).

STATUS

Documentation of basic biology (growth-curve, feeding, reproduction, predators, longevity, seasonality), is nearing completion. Individuals are characteristically clumped; 4 types of aggregation occur (mixed age-class; juvenile only; mating; contact clustering), each type being characterized by a particular density, age-structure, area and temporal persistance. 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. An experiment to test the effect of various intensities of human exploitation is currently in progress.

GEOGRAPHIC REGION: R
MAJOR DESCRIPTORS: *Strombus luhuanus* /Gastropoda/Population dynamics/Exploitation/

[GRIFFI010]

166 Aspects of the biology of herbivorous reef fishes, with particular reference to parrotfish (family Scaridae)

PERIOD: March 1981 - December 1984

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

PROJECT LEADERS: Mr D.R. Bellwood (077) 814883
Dr N.E. Milward (077) 814193

CONTACT OFFICER: Dr N.E. Milward

EXPENDITURE: $2,000 (this year), $4,300 (all years)

MANPOWER: 1.00 (this year), 2.30 (all years)

EXTERNAL SUPPORT: Drapers' Company (U.K.) - $21,000 (Includes student renumeration funds for travel and $1000 for research project.)
GBRMPA - $1,000

OBJECTIVES

To determine the trophic mechanisms and relationships, and the survival strategies of parrotfishes, with particular reference to: (a) the common species on inshore fringing reefs and outer barrier reefs; (b) juvenile stages.
To compare findings with the existing knowledge on other herbivorous reef fishes.

METHODOLOGY

Field observations and sampling on inshore fringing reefs at Magnetic Island and Orpheus Island, off Townsville, and on outer barrier reefs in the vicinity of Lizard Island, northern Barrier Reef. Laboratory experiments on feeding behaviour and processes, and analyses relating gut contents of captured fish to observed behaviour and morphology of study species.

STATUS

Field observations have been carried out, predeminantly at Lizard Island and laboratory studies are 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

Some coordination has been achieved with the reef fish project being conducted by Dr D. Williams, Australian Institute of Marine Science.

LOCALITIES: Magnetic Island; Orpheus Island; Lizard Island

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Scaridae/Osteichthyes/Herbivores/Trophic relationships/Survival/

[JAMESC017]

167 Depth distribution of Hermatypic scleractinian corals.

PERIOD: January 1980 - December 1984

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

PROJECT LEADER: A/Prof M. Pichon (077) 814432

OBJECTIVES

To investigate depth-distribution of reef corals on the slopes of selected reefs off Townsville and Lizard Island.
To collect sufficient data for general patterns to emerge.

METHODOLOGY

Samples will be quantitative (line-intercept method) or semi-quantitative (dredging and sledging).

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.

LOCALITIES: Lizard Island; Townsville

GEOGRAPHIC REGION: R

SHIP TIME REQUIREMENTS: 4 days

MAJOR DESCRIPTORS: Anthozoa/Vertical distribution/Depth/Biological surveys/

[JAMESC030]

168* Distribution and abundance of epibenthic/hypoplanktonic communities in the Davies Reef Lagoon.

ORGANIZATIONS: James Cook University of North Queensland
School of Biological Sciences
Post Office
Townsville, Qld 4811

Australian Institute of Marine Science
P.M.B. 3, M.S.O.
Townsville, Qld 4810

PROJECT LEADERS: Dr R.F. Hartwick (077) 814272 (JCU)
Mr J.H. Carleton (077) 789211 (AIMS)

CONTACT OFFICER: Dr R.F. Hartwick

EXPENDITURE: $400 (this year), $3,500 (all years)

MANPOWER: 0.50 (this year), 2.50 (all years)

OBJECTIVES

To obtain an understanding of the epibenthic hypoplanktonic community in a coral reef lagoon, in terms of abundance composition, distribution and biomass as it related to depth, time of day and season. The work is concentrated on the mysid component.
To obtain an estimate of the possible importance of this community to the Reef in terms of nutrient regeneration and to compare a newly developed benthic plankton sampling device with existing techniques.

METHODOLOGY

A newly developed diver-operated plankton-sampler was used to sample a 10 m^2 section of the lagoon floor. Simultaneous horizontal and vertical net samples were taken to study distribution through the water column. Sampling was carried out during the day and at night, throughout the year. A minimum of 3 replicates were taken per sampling device.

STATUS

Field sampling has been completed. Two sets of replicates have been analysed for all seasons. A total of 120 groups of benthic organisms were present of which 16 species of mysids have been keyed to species.

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Zooplankton/Coral reefs/Community composition/Variations/Nutrient cycles/

[JAMESC034]

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169 Dynamics of a shallow water marine community.

PERIOD: January 1981 - April 1985

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

PROJECT LEADERS: Prof C. Burdon-Jones (077) 814530
Dr J.R. Ottaway (09) 3222477

CONTACT OFFICER: Prof C. Burdon-Jones

EXPENDITURE: $22,500 (this year), $42,500 (all years)

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

EXTERNAL SUPPORT: Mount Isa Mines - $247,911

OBJECTIVE

To study the dynamics of epifauna and infauna at depths of 0 - 30 metres immediately offshore from Abbot Point, Queensland. To assess the effects on the community of the construction of a ship-loading wharf, and then of coal- loading operations.

METHODOLOGY

Permanent areas have been set up in order to monitor natural community changes over a period of 3 years.
Regular sampling of interidal and offshore stations is being conducted.

STATUS

All Surveys have been undertaken, and detailed analyses of benthic communities are in progress. The study is concentrating mainly on macrobiota.

LOCALITY: Abbot Point

GEOGRAPHIC REGION: R

SHIP TIME REQUIREMENTS: 5 days

MAJOR DESCRIPTORS: Community composition/Sublittoral zone/Long term changes/Baseline studies/

[JAMESC024]

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170 Ecology and physiology of the molluscan (Gastropoda) genera *Cellana* and *Siphonaria*

PERIOD: January 1977 -

ORGANIZATION: James Cook University of North Queensland
Department of Zoology
Post Office
Townsville, Qld 4811

PROJECT LEADER: A/Prof R.P. Kenny (077) 814265

EXPENDITURE: $460 (this year), $1,600 (all years)

MANPOWER: 0.20 (this year), 0.70 (all years)

OBJECTIVES

1. To determine effects of temperature and desiccation in relation to the distribution of these intertidal gastropods.
2. To examine the respiratory physiology of these gastropods in relation to temperature and tidal patterns.
3. To study the relationship between temperature and growth of the genus *Cellana* .
4. To determine the taxonomy of the coral sea species of the genus *Siphonaria* .

METHODOLOGY

1. Field investigation of distributions relative to tidal patterns and microclimate.
2. Laboratory determination of respiratory rates.
3. Examination of growth characteristics from latitudinally differing populations.
4. Scanning electron microscopy of radulae.

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: *Cellana* / *Siphonaria* /Gastropoda/Ecological distribution/Geographical distribution/

[JAMESC019]

171 Marine insects of Barrier Reef coastal waters.

PERIOD: - December 1984

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

PROJECT LEADER: Dr J.D. Collins (077) 814144

EXPENDITURE: $150 (this year), $250 (all years)

MANPOWER: 0.10 (this year), 0.20 (all years)

OBJECTIVE

To investigate the species, and seasonal and spatial distribution of marine insects in coastal waters of the Barrier Reef near Townsville.

METHODOLOGY

Regular sampling of neuston from small boats using a specially designed neuston net.

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.

LOCALITY: Townsville

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Insecta/Geographical distribution/Temporal distribution/Check lists/Neuston/

[JAMESC043]

172 Subtidal algal ecology of North Queensland reefs with special reference to zonation and seasonality.

PERIOD: November 1979 - June 1985

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

PROJECT LEADERS: Ms J.B. Hart (077) 814252
Dr I.R. Price (077) 814252

CONTACT OFFICER: Ms J.B. Hart

EXPENDITURE: $220 (this year), $2,175 (all years)

MANPOWER: 0.25 (this year), 1.25 (all years)

OBJECTIVES

1. To undertake a survey of the macroalgal vegetation of the reefs on a cross-shelf transect in the northern Great Barrier Reef region, and to analyse the data in an effort to establish species composition, relative species abundance and community types, both across a reef and across the shelf.
2. To study an inshore fringing reef to obtain detailed information on the subtidal seasonal changes in the macroalgal flora.

METHODOLOGY

A semi-quantitative survey of the algal flora using graded data has been undertaken on a cross-shelf transect in the Lizard Island area, from Yonge reef on the outer barrier, across Mac's reef, Lizard Island, Eagle reef to Decapolis reef. It is proposed to analyse these data using pattern analysis with hierarchical cluster techniques to establish community types, and to relate these to information on prevailing environmental conditions.
Sixteen permanent sites have been established at Magnetic Island, an inshore high-island with fringing reefs. They are visited monthly to record abundance, size and reproductive status of the algae present.

STATUS

Field work in the Lizard Island area has been completed and the data are currently being collated to establish a cross-shelf species list and to establish information on the relative abundance of species during summer and winter.
An analysis, in conjunction with coral data available from the same area, to establish community types is yet to be undertaken.
From the information collected so far a definite pattern of the seasonal changes in the algal flora is emerging.

LOCALITIES: Lizard Island; Magnetic Island

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Algae/Sublittoral zone/Coral reefs/Ecological zonation/Seasonal variations/

[JAMESC026]

173* **Behaviour, age and growth determinations of larval coral reef fishes.**

PERIOD: June 1980 - December 1983

ORGANIZATION: Lizard Island Research Station
P.M.B. 37
Cairns, Qld 4870

PROJECT LEADERS: Dr B. Goldman (070) 534500
Prof F.H. Talbot (02) 889705

CONTACT OFFICER: Dr B. Goldman

EXPENDITURE: $25,000 (this year), $80,000 (all years)

MANPOWER: 1.30 (this year), 4.00 (all years)

EXTERNAL SUPPORT: AMSTAC-FAP - $24,000

OBJECTIVES

To identify and quantify mechanisms for maintaining or dispersing the eggs and larvae of fishes in tropical coral reef waters.
To investigate reproductive patterns of reef fishes, especially to detect any relationship between spawning and moon phase, tide phase and local current patterns.
To age fish larvae to determine periods of planktonic life during which fish larvae are potentially able to disperse.

METHODOLOGY

Field caught fish eggs and larvae are collected from among the coral by plankton nets attached to a battery operated underwater diver propulsion vehicle (DPV). This is the first time such a method has been used on coral reefs. Collections are made in a number of habitats from 30 meters deep off the reef to over the reef flat, and are stratified to cover diurnal, tidal and moon phase periods.
Fish eggs and larvae are reared in the aquaria to expand the taxonomic basis, and to provide samples of known age for back-calculating ages of field caught specimens.

STATUS

DPV needed modifications which have been completed and successfully deployed (e.g. extra floatation, net-mounting frame).
Two 6-week sampling periods completed - fish larvae collected by the DPV are comparable in abundance to those caught (in similar habitats) by conventional methods. Egg and larvae abundances are markedly different over different reef habitats - if even only 100 meters apart. Temporal differences in abundance are being observed, but it is not yet known what these relate to (tide, moon etc). Several publications are in preparation describing the eggs and larvae of reef fishes hitherto undescribed.

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 by Goldman & Leis on reef fish eggs and larvae around Lizard Island. Studies by Dr R. Thresher (Sydney Univ.) on breeding of coral fishes. Work by Ian R Smith (NSW State Fisheries) on culture methods for rearing fish eggs and larvae.

LOCALITY: Lizard Island

GEOGRAPHIC REGION: R

SHIP TIME REQUIREMENTS: Project by Goldman & Leis on reef fish eggs and larvae arounf Lizard Island. Studies by Dr R. Thresher (CSIRO) on breeding of coral fishes.

MAJOR DESCRIPTORS: Coral reefs/Pisces/Larvae/Population dynamics/Dispersion/

[LIRS--001]

174* Biological investigations at Escape Reef.

ORGANIZATION: Marine Research Foundation
P.M.B. 1
Daintree, Qld 4873

PROJECT LEADERS: Dr W. Starck (070) 986151
Dr A. Ayling (070) 986151

CONTACT OFFICER: Dr W. Starck

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

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

OBJECTIVE

To map the habitats and assess the species composition, abundance and distribution of fishes, corals and sponges at the study reef.

METHODOLOGY

A single study reef, Escape Reef, on the outer Great Barrier Reef at 15° 50′ S. latitude has been chosen for a concentrated long term program of investigations. A permanent home base for the study has been established on the Daintree River 36 nautical miles from Escape Reef. Eight to twelve weeks are spent each year at the reef with the 104 ton research vessel *El Torito* . A 9 metre vessel for shorter trips to the reef will be launched in 1981. A diver transport submarine, helium balloon, underwater colour video, two 9 metre skiffs and various other equipment are part of the program.

STATUS

The Escape Reef program is now in its fourth year. Basic facilities at the shore base at Daintree have been established and the first working season on the reef carried out. A habitat map of the reef has been prepared. Study transects and quadrats have been established and counts and measurements of corals, sponges and selected reef fishes have been made. Several new records and new species of fishes and sponges have been collected.

CO-ORDINATION WITH OTHER PROJECTS

Intensive fish collecting (in co-operation with the Australian Museum) and behavioural ecology studies of grazing fishes utilizing a manned helium balloon (in co-operation with Smithsonian Tropical Research Institute) were carried out in 1981. Further aerial survey work utilizing an ultralight amphibious aircraft are planned for 1983.

GEOGRAPHIC REGION: R

SHIP TIME REQUIREMENTS: 60 days

MAJOR DESCRIPTORS: Biocoenosis/Habitat/Community composition/Abundance/

[MRF---001]

175 Giant clam populations.

PERIOD: December 1984 - June 1985

ORGANIZATIONS: Queensland Department of Primary Industries
Fisheries Research Branch,
GPO Box 46,
Brisbane, Qld. 4001

James Cook University of North Queensland
Townsville, Qld. 4811

PROJECT LEADERS: Mr R.G. Pearson (07) 2276432
Dr J. Munro

CONTACT OFFICER: Mr R.G. Pearson

EXTERNAL SUPPORT: GBRMPA - $9,990

OBJECTIVE

To establish population parameters (growth, recruitment and natural mortality) for the giant clams *Tridacna gigas* and *Tridacna derasa* .

METHODOLOGY

All field work will take place on Michaelmas Reef in January 1985 when a tagged population of over 1 200 giant clams will be recensused. Particular emphasis will be given to juvenile *T. gigas* and *T. derasa* (3 to 20cm shell length) in terms of predation and microhabitat within the 2.7 ha study area.

STATUS

Several previous censuses beginning in 1978/79 - provided data on rates of growth, recruitment and natural mortality for *T. gigas* and *T. derasa* . The proposed recensus will provide additional data thus covering a period of 6 years.

CO-ORDINATION WITH OTHER PROJECTS

With Dr. J.S. Lucas, ACIAR/JCUNQ project on giant clam mariculture.

LOCALITY: Michaelmas Reef

GEOGRAPHIC REGION: R

SHIP TIME REQUIREMENTS: 21

MAJOR DESCRIPTORS: Tridacna/Ecology/Population dynamics/

[QDPI--024]

176 Studies on toxic dinoflagellates responsible for formation of ciguatoxin.

ORGANIZATION: Queensland Department of Primary Industries
Fisheries Research Branch
Southern Fisheries Research Centre
P.O. Box 76
Deception Bay, Qld 4508

PROJECT LEADER: Dr N.C. Gillespie (07) 2031444

EXPENDITURE: $24,000 (this year), $54,000 (all years)

MANPOWER: 3.00 (this year)

EXTERNAL SUPPORT: FIRTA - $19,000

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) To determine the effect of seasons, monthly sampling in one or two high population areas will be carried out.
(5) Culture of isolated strains under varying conditions of temperature and substrate.

STATUS

Approximately 24 locations along the Queensland coast have been surveyed for populations of *G. toxicus* . Good information has been obtained on the algal substrate preferred by the organism. Blooms of the organism have been observed in some locations. Field observations have provided good data on factors leading to ciguatera outbreaks.
A large number of cultures of *G. toxicus* are presently being maintained and mass culture techniques are well advanced.

GEOGRAPHIC REGIONS: R,Q
SHIP TIME REQUIREMENTS: 20 days
MAJOR DESCRIPTORS: *Gambierdiscus toxicus* /Dinoflagellata/Ciguatoxins/Poisonous organisms/Distribution patterns/

[QDPI--016]

177* Taxonomy and ecology of Scyllaridae, especially *Thenus orientalis* (Lund) (Crustacea:Decapoda) in northern Great Barrier Reef waters.

PERIOD: January 1983 - January 1987

ORGANIZATIONS: Queensland Department of Primary Industries
Queensland Fisheries Service
Northern Fisheries Research Centre
C/- P.O.
Bungalow, Qld 4870

University of Queensland
Department of Zoology
St. Lucia, Qld 4067

PROJECT LEADERS: Dr G.B. Goeden (070) 515588
Dr J.G. Greenwood (07) 3772471

CONTACT OFFICER: Mr C. Jones (070) 515588

MANPOWER: .50 (this year), .50 (all years)

OBJECTIVES

1. Document the Scyllarid species of the northern Great Barrier Reef region and Gulf of Carpentaria.
2. Determine the localised distribution of *T. orientalis* and *Scyllarus* sp. within a 30 mile^2 region off Cairns incorporating a variety of major habitat types and depths. This distribution will be defined in terms of substrate, depth, prey spp. and hydrological parameters.
3. Substantiate habitat preferences and activity cycles by experimentation under laboratory conditions.
4. Investigate population dynamics by gathering morphometric data regularly over 18 months -2 years.
5. Investigate morphological variation of *T. orientalis* throughout its range in Queensland.

METHODOLOGY

Documentation of Scyllarid spp. will be carried out by trawl and scuba collection over a period of years. An intensive study off Cairns will be conducted using a 23 foot stern rigged trawler, with 3 fathom net at selected sampling sites on a monthly basis, beginning Spring 1983. Remote sensing equipment and laboratory aquaria will be used in experimentation. Video, remote control of lighting and temperature will enable observation of simulated natural conditions. Morphometric data will be compiled from material gathered off Cairns and from trawl samples from the Q.F.S. Research trawler in her activities along the coast of Queensland.

STATUS

Through trawl and scuba collection five species of Scyllarida have been documented to date, from waters between Karumba and Cairns. Correspondence with Dr L.B. Holthuis (Netherlands) has been established in order to determine taxonomic status of three of these species. The 23' trawler 'Sunbird' is at present being fitted out in preparation for sampling. Morphometric data is being compiled from regular samples taken in the Southern Gulf and from incidental trawl samples elsewhere. Aquaria and remote sensing equipment are being prepared for experimentation to determine sediment preference, food preference and

activity cycles.

GEOGRAPHIC REGIONS: R,C
SHIP TIME REQUIREMENTS: 63 days
MAJOR DESCRIPTORS: Scyllaridae/Decapoda/Taxonomy/Ecology/

[QPDI--017]

178* Queensland turtle research project.

PERIOD: July 1974 -
ORGANIZATION: Queensland National Parks and Wildlife Service
P.O. Box 190
North Quay, Qld 4000
PROJECT LEADER: Mr C. Limpus (077) 741411
EXPENDITURE: $89,000 (this year)
MANPOWER: 5.30 (this year), 35.00 (all years)
EXTERNAL SUPPORT: AMSTAC-FAP - $25,500 (For 1981-82.)

OBJECTIVES

1. To determine key rookery areas and general nesting distributions.
2. To determine courtship and feeding grounds related to these rookeries.
3. To measure growth and age characteristics.
4. To measure life table parameters.
5. To prepare management plans for the conservation of Queensland sea turtle population.

METHODOLOGY

The study centres around extensive tagging programs on selected nesting beaches and feeding grounds. Because sea turtle nesting is synchronised throughout eastern Australia the large labour force required to monitor nesting populations is provided through a trained team of volunteers. First studies (continuing) concentrated on nesting females. Later studies concentrated on developing a methodology for capturing turtles in feeding grounds. Lately, courting turtles have been added to the study program.

STATUS

Most methodology required has now been developed and in use for sufficient time to provide the tagged populations that are now the subject of intense study to determine such parameters as growth, movement, fecundity, mortality.

GEOGRAPHIC REGIONS: C,J,R,Z,Q
SHIP TIME REQUIREMENTS: 4 days
MAJOR DESCRIPTORS: Chelonia/Population dynamics/Geographical distribution/Growth/Resource management/

[QNPWS-001]

179 Ecology of marine parasites.

PERIOD: January 1973 -

ORGANIZATION: University of New England
Department of Zoology
Armidale, N.S.W. 2351

PROJECT LEADER: A/Prof K. Rohde (067) 733333

EXPENDITURE: $22,500 (this year), $80,000 (all years)

MANPOWER: 4.00 (this year), 25.00 (all years)

EXTERNAL SUPPORT: ARGS - $12,500
LABRS - $10,000

OBJECTIVES

To study latitudinal gradients in species diversity, niche utilization, competition and causes of niche restriction in marine parasites.
To study zoogeography and economic importance of marine parasites.

METHODOLOGY

Taxonomy of marine parasites using simple histological methods.
Niche mapping of marine parasites.
Electron microscopy of some structures of marine parasites.
Computer analyses of frequency distributions, correlations of co-occurrence etc.
Pathology of infections using histological methods.

STATUS

Approx. 30 papers published in international journals.
Book on 'Ecology of marine parasites' in press (University of Queensland Press)
Approx. 100 species of Monogene and Copepoda described
A new hypothesis explaining niche restriction and tropical species richness established.

CO-ORDINATION WITH OTHER PROJECTS

Collaboration with CSIRO Cronulla and fisheries departments in South Australia, Queensland and New South Wales to collect fish.

GEOGRAPHIC REGIONS: B,G,R,Q,N

MAJOR DESCRIPTORS: Parasites/Biogeography/Distribution patterns/Economics/Ecological distribution/

[UNIARM002]

180 Ecology of the Swain Reefs.

ORGANIZATION: University of New England
Department of Zoology,
Armidale, N.S.W. 2351

PROJECT LEADER: Mr H. Heatwole (067) 733333

EXPENDITURE: $25,000 (this year), $45,000 (all years)

EXTERNAL SUPPORT: USF (U.S.A.)
Mayers Foundation
MSTGS - $72,460

OBJECTIVES

1. To study the community ecology of the coral cays, especially the influence upon the vegetation of 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

162 scientific publications including 3 books.

LOCALITY: Swain Reefs

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Ecology/Cays/Coral reefs/Community composition/

[UNIARM005]

181 **Abundance, Schooling Behavior and Population Composition of Sprats (Clupeidae) and Silversides (Atherinidae).**

PERIOD: November 1982 - November 1985

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

PROJECT LEADER: Dr K. Warburton (07) 3772979

CONTACT OFFICER: Ms P. Dupee (07) 3772992

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 - $900 (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

Field work completed.
Initial stages of data analysis in progress.
Formal report on sampling methodology nearing completion.

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Atherinidae/Dussumieriidae/Pisces/Population dynamics/Schooling behaviour/

[UNIQLD036]

182 **Ecological importance of patterning in the emergence of demersal zooplankton.**

PERIOD: December 1984 -

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

PROJECT LEADERS: Dr J.G. Greenwood (07) 3772504
Dr C.A. Jacoby (07) 3772471

CONTACT OFFICER: Dr J.G. Greenwood

EXTERNAL SUPPORT: ARGS - $14,700

OBJECTIVE

Characterize patterns of emergence in demersal zooplankton and examine environmental factors that are correlated with these patterns.

METHODOLOGY

Rotary emergence traps which automatically take up to 12 separate samples over a preset interval will be set over different substrata. Samples will be classified and enumerated. Environmental factors, such as light intensity and temperature, will be measured simultaneously. Analysis of variance will be used to determine if patterns in emergence exist and are affected by various factors.

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/Ecology/Distribution patterns/Benthic zone/

[UNIQLD052]

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183 **Horizontal distributions of demersal zooplankters as related to type of substratum.**

PERIOD: February 1984 - February 1986

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

PROJECT LEADER: Dr C.A. Jacoby (07) 3772471

EXPENDITURE: $2,300 (this year)

MANPOWER: 1.25 (this year)

EXTERNAL SUPPORT: American Philosophical Society - $1,000
MSTGS

OBJECTIVE

Characterize distributions of demersal zooplankton from different substrata and examine possible causes of observed patterns.

METHODOLOGY

Emergence traps are used to capture zooplankton as they migrate from the substratum into the water column at night. Samples are fixed and later enumerated. Analysis of variance will be used to compare distributions between substrata. Laboratory observations and experiments and field experiments will be used to investigate causes of distributional patterns.

STATUS

Winter samples from sites in Heron Island Lagoon and off Stradbroke Island in Moreton Bay are being analyzed. Variability betwen supposed "replicate" samples will complicate comparisons between substrata, but some animals obviously associate with particular substrata. New species of calanoids in the genus *Stephos* have been found.

CO-ORDINATION WITH OTHER PROJECTS

ARGS funded study of emergence patterns of demersal zooplankton as submitted by Dr J.G. Greenwood and Dr C.A. Jacoby.

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Zooplankton/Distribution patterns/Benthic environment/

[UNIQLD070]

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184 Research on biting midges.

PERIOD: July 1965 -

ORGANIZATION: University of Queensland
Department of Entomology
St. Lucia, Qld 4067

PROJECT LEADER: E.J. Reye (07) 3773644

EXTERNAL SUPPORT: Up to about 30 local authorities and industries; variable year to year. Currently 24. - $200,000

OBJECTIVE

Taxonomy, biology, and control of biting midges (Diptera, ceratopogonidae) of the inter-tidal zone.

METHODOLOGY

Development of methods of survey of adult and larval populations. Exploitation of life-cycle characteristics to modify larval habitats so the resulting adult populations is below pest level with minimal interference to adjacent ecosystems.

STATUS

Larval habitats of most pest species are more or less known for general characteristics.
Quantitative estimations can be made of larval densities in sand or sand-mud substrates.
Quantitative estimations can be made of adult emergence rates.
tidal planes can be defined using tides themselves in reference to nearest tide gauge.
Vertical intervals of beach slopes can be measured over distances of about 20m.
Several types of light-traps for adults using 240v arc in operation - can be used singly or in formation.
Two types of emergence trap for inter-tidal use have been developed.
Considerable collection of material in alcohol - mostly catalogued - in a standard filing storage.

GEOGRAPHIC REGIONS: C,R,Q,N

MAJOR DESCRIPTORS: Diptera/Insecta/Taxonomy/Life cycle/Pest control/

[UNIQLD049]

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185 Demographic studies of "Aquarium" reef fish.

PERIOD: July 1983 - June 1986

ORGANIZATION: University of Sydney
School of Biological Sciences,
Sydney, N.S.W. 2006

PROJECT LEADERS: Assoc Prof P.F. Sale (02) 6922440
Mr B. Mapstone
Mr T. Jones
Mr D. Ferrell
Mr A. Fowler

CONTACT OFFICER: Assoc Prof P.F. Sale

EXPENDITURE: $12,000 (this year), $26,000 (all years)

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

EXTERNAL SUPPORT: GBRMPA - $41,300

OBJECTIVE

To obtain demographic data on selected species potentially important to aquarium trade, and to assess impact on stocks of commercial collection to provide management recommendations based on these data.

METHODOLOGY

Standard observational and manipulative field ecological methods used to document recruitment, growth, mortality. Analysis of otoliths and other morphological features to age samples of fish.

STATUS

Equipment has been obtained, and techniques for aging young and adult fish are being explored. Data on recruitment of selected species from field censuses. Some manipulative studies to assess effect of collection of juveniles are being commenced.

LOCALITY: One Tree Island

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Population dynamics/Coral reefs/Pisces/Commercial species/

[UNISYD042]

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186 Demography and population ecology of Pomacentrids.

PERIOD: January 1983 - December 1986

ORGANIZATION: University of Sydney
School of Biological Sciences,
Sydney, N.S.W. 2006

PROJECT LEADERS: Mr B. Mapstone
Assoc Prof P.F. Sale (02) 6922440

CONTACT OFFICER: Assoc Prof P.F. Sale

EXPENDITURE: $900 (this year), $900 (all years)

MANPOWER: 1.00 (this year), 2.00 (all years)

EXTERNAL SUPPORT: ACRS - $500

OBJECTIVE

To investigate the population biology of *Pomacentrus molluccensis* and other benthic but non-territorial pomacentrids with particular emphasis on social organization, habitat use, and demography.

METHODOLOGY

Standard field observational and manipulative techniques. Data on juvenile recruitment gathered at several spatial scales.

STATUS

Techniques for marking individuals for field recognition have been perfected. Recruitment have been monitored over one summer season.

LOCALITIES: One Tree Island; Capricorn Group

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: *Pomacentrus* /Population dynamics/Ecology/

[UNISYD045]

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187 **Nutritional and eco-physiological aspects of symbioses between algae and invertebrates.**

PERIOD: June 1982 - June 1986

ORGANIZATIONS: University of Sydney
School of Biological Sciences,
Building A12,
Sydney N.S.W. 2006

Murdoch University
School of Environmental and Life Sciences
Murdoch, W.A. 6150

PROJECT LEADERS: Dr R.T. Hinde (02) 6924035
Dr M.A. Borowitzka (09) 3322211

CONTACT OFFICER: Dr R.T. Hinde

EXPENDITURE: $2,885 (this year)

MANPOWER: 0.36 (this year)

EXTERNAL SUPPORT: MSTGS - $43,819 (Grant administered through University of Sydney.)

OBJECTIVE

To establish the role of the blue-green algal symbiont 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 metabolites of the One Tree Island population of *D. herbacea* have been identified. Isolated algae and sponge tissue are being accumulated for analyses.

LOCALITY: One Tree Island

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: *Oscillatoria spongeliae* /Cyanophyta/ *Dysidea herbacea* /Porifera/Symbiosis/

[UNISYD031]

188 **Population ecology of chaetodontid fishes.**

PERIOD: January 1984 - December 1987

ORGANIZATION: University of Sydney
School of Biological Sciences,
Sydney, N.S.W. 2006

PROJECT LEADERS: Mr A. Fowler
Assoc Prof P.F. Sale (02) 6922440

CONTACT OFFICER: Assoc Prof P.F. Sale

EXPENDITURE: $900 (this year), $900 (all years)

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

OBJECTIVE

To determine the social organization, the habitat use, and the life history of selected species of butterfly fish at One Tree Reef.

METHODOLOGY

Standard field observational and manipulative ecological techniques.

STATUS

Methods for marking fish have been established and studies of habitat and social organization have begun on three lagoonal species of chaetodontid.

LOCALITIES: One Tree Island; Capricorn Group

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Chaetodontidae/Population dynamics/Ecology/Life history/

[UNISYD044]

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189 Recruitment of Herbivorous Reef Fishes.

PERIOD: January 1984 - December 1986

ORGANIZATIONS: University of Sydney
School of Biological Sciences,
Sydney, N.S.W. 2006
University of Auckland
Department of Zoology,
Private Bag,
Auckland, New Zealand

PROJECT LEADERS: Dr J.H. Choat University of Auckland
Assoc Prof P.F. Sale University of Sydney

CONTACT OFFICER: Assoc Prof P.F. Sale

EXPENDITURE: $5,300 (this year), $5,300 (all years)

MANPOWER: 0.25 (this year), 0.25 (all years)

EXTERNAL SUPPORT: MSTGS - $8,909

OBJECTIVE

To describe and quantify patterns of juvenile recruitment of herbivorous reef fishes, esp. scaridae, with emphasis on spatial and temporal variation in rate of recruitment. Consequences for intensity of herbivory and for size of standing stocks will be considered.

METHODOLOGY

Standard observational and manipulative field ecological techniques applied to taxonomically "difficult" juvenile scarid fauna.

STATUS

Scarid recruitment was quantified at northern mid-shelf northern outer barrier, and southern sites in 1983-84. Recruits show high local patchiness related to microhabitat features. Sampling will continue and be extended to other herbivores. Manipulative studies will be commenced.

LOCALITIES: One Tree Island; Lizard Island

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Scaridae/Osteichthyes/Herbivores/Recruitment/

[UNISYD038]

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190 Reef-fish ecology.

PERIOD: January 1968 - December 1983

ORGANIZATION: University of Sydney
School of Biological Sciences
Sydney, N.S.W. 2006

PROJECT LEADER: Dr P.F. Sale (02) 6922440

EXPENDITURE: $200,000 (all years)

MANPOWER: 40.00 (all years)

EXTERNAL SUPPORT: ARGS - $20,670
AMSTAC-FAP - $19,410
GBRMPA - $615 (Larval fish ecology Ms P Schmitt)
GBRC - $500 (Larval fish ecology Ms P. Schmitt)

OBJECTIVE

To study various aspects of the basic ecology of reef fish communities to understand their structure, their persistence, and the underlying factors determining structure and persistence.

METHODOLOGY

Observational and manipulative experimental field ecology, plus some computer simulation.

STATUS

Effort in 1981 was directed to studying patterns of recruitment and recruit survival, microhabitat requirements of recruits, and effects of piscivores and potential competitors on recruitment and recruit survival.
Published results have demonstrated that tropical communities are not stable, equilibrium systems as usually supposed. Current work is demonstrating the substantial degree of variability in structure inherent in these communities. The study has had an impact in general ecology, as well as in the more restricted field of reef fish studies.

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

LOCALITY: One Tree Island

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Pisces/Coral reefs/Ecology/COmmunity composition/Population dynamics/

[UNISYD019]

191 Role of Detritus in the nitrogen budget of Coral Reef Lagoon.

PERIOD: January 1983 -

ORGANIZATION: University of Sydney
School of Biological Sciences,
Building A12,
Sydney, N.S.W. 2000

PROJECT LEADER: Assoc Prof A.W.D. Larkum (02) 6923369

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

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

EXTERNAL SUPPORT: Linnean Society of NSW - $5,000 (Research studentship to Mr R. Johnstone)
GBRMPA - $800 (To Mr R. Johnstone)
MSTGS - $51,240 (For 1985)

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 will be 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.

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Nitrogen fixation/Bacteria/Coral reefs/Abiotic factors/

[UNISYD046]

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192 **Sexual patterns and competitive interactions in species of labrid genus *Thalassoma* .**

PERIOD: February 1981 - December 1984

ORGANIZATION: University of Sydney
School of Biological Sciences,
Sydney, N.S.W. 2006

PROJECT LEADERS: Ms G. Eckert
Assoc Prof P.F. Sale (02) 6922440

CONTACT OFFICER: Assoc Prof P.F. Sale

EXPENDITURE: $500 (this year), $8,000 (all years)

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

EXTERNAL SUPPORT: GBRMPA - $1,673

OBJECTIVE

To investigate social organization, and life history strategy in species of *Thalassoma* , and to explore recruitment patterns in these species.

METHODOLOGY

Standard field observational and manipulative techniques are used. Some gonad histology.

STATUS

Changes in social organization dependent on physical environment have been documented. Development and maintenance of social groups has been explored. Patterns of juvenile recruitment have been documented at several spatial scales.

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: One Tree Island; Capricorn Group

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: *Thalassoma* /Ecology/Life history/Sexual reproduction/Competition/

[UNISYD043]

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193 **Structure in Coral Reef Fish communities.**

PERIOD: January 1972 -

ORGANIZATION: University of Sydney
School of Biological Science,
Sydney, N.S.W. 2006

PROJECT LEADER: Assoc Prof P.F. Sale (02) 6922440

EXPENDITURE: $26,349 (this year), $200,000 (all years)

MANPOWER: 1.40 (this year), 15.00 (all years)

EXTERNAL SUPPORT: ARGS - $26,349

OBJECTIVE

To assess the predictability and constancy of structure of reef fish assemblages with emphasis on whether these species-rich groupings are equilibrial or non-equilibrial in organization.

METHODOLOGY

Standard observational and manipulative field ecological techniques plus some computer simulations.

STATUS

Assemblages studied have occupied isolated coral heads (1972-77) or lagoonal patch reefs. Data on groups using continuous habitat now commenced. Role of microhabitat features in determining assemblage structure has been examined. Geographic variation in structure of patch reef assemblages has been assessed using data from Lizard Island and Caribbean sites with primary data from One Tree. Important role of variable juvenile recruitment has been identified.

LOCALITY: One Tree Island

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Coral reefs/Pisces/Ecology/Population structure/Distribution patterns/

[UNISYD040]

See also: 64, 65*, 67, 72, 74, 77*, 80, 102*, 105, 109*, 110, 132, 134*, 199, 237

See: 72, 73, 102*, 171, 172, 174*, 205, 207

See: 29*, 84*

194* Prehistoric Aboriginal exploitation of Islands of the central Queensland coast.

ORGANIZATIONS: University of Queensland
Department of Anthropology and Sociology
St Lucia, Qld 4067

Queensland Department of Aboriginal and Islander Advancement
Department of Aboriginal and Islander Affairs
G.P.O. Box 2210
Brisbane, Qld 4001

PROJECT LEADER: Mr M.J. Rowland (07) 2245716

EXPENDITURE: $2,500 (this year), $10,500 (all years)

MANPOWER: 0.50 (this year), 1.50 (all years)

EXTERNAL SUPPORT: Australian Heritage Commission - $2,000
GBRMPA - $440 (1980)

OBJECTIVE

To expand the comparative basis of the study on the Keppel Islands by studying islands to the north i.e. the Percy Islands and Whitsunday Islands.

STATUS

Twelve sites have been recorded on South Keppel, 3 on North Keppel and several more on the smaller offlying islands. Excavation has been undertaken of 10 sites on South Keppel and one on North Keppel. The site on North Keppel (Mazie Bay) has provided a complex sequence of occupation and then abandonment over 4000 yrs. All sites are midden / occupation sites, except for one on South Keppel which is a stone working area. All sites contain a wide range of shellfish species from the rocky shore, sandy shore and surrounding reefs, a number of fish species, turtle and dugong and shell and stone artifacts.
A chronological sequence has been established indicating the islands were exploited at about the time that they first became islands through to the period of European arrival.
In 1982 surveys were undertaken on Middle Percy Island and on Islands in the Whitsunday group. Five middens were located on Middle Percy and a number of rock-shelters with art and occupation deposits on the Whitsunday Islands. Project will continue of islands further north.

CO-ORDINATION WITH OTHER PROJECTS

Analysis of pumice and sand samples from Mazie Bay with Dr Bill Ward (CSIRO Brisbane). Dating of bone samples by Electron Spin Resonance Spectroscopy with Dr Peter Pomery (Department Physical Chemistry) Univ. of Qld.

LOCALITY: Keppel Isles

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Aborigines/Exploitation/Archaeology/Keppel Islands/

[UNIQLD001]

See: 226

See: 179, 197

See: 233

195 Study of the Decision-Making Behaviour of Day Visitors to the Great Barrier Reef Marine Park.

PERIOD: January 1983 - December 1983

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

University of New England (Subcontract)
Department of Geography,
Armidale, N.S.W. 2351

PROJECT LEADERS: Dr W. Craik (077) 818811
Mr N. Whittem (067) 722911

CONTACT OFFICER: Dr W. Craik

EXPENDITURE: $720 (all years)

MANPOWER: 1.00 (all years)

OBJECTIVE

To determine demographic and socioeconomic characteristics and motivations of day visitors. To obtain information on visitor perception, awareness and expectations related to the visit to the Reef Region. To use the information to compare decision-making behaviour of day visitors to Beaver Cay (reef) and to Dunk/Bedarra Islands (continental islands).

METHODOLOGY

Questionnaires will be distributed to samples of visitors to Beaver Cay and Dunk/Bedarra pre and post visit.

STATUS

Report submitted to 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.

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Tourists/Attitudes/Sociological aspects/Marine Parks/

[GBRMPA040]

196 Major survey research programme (M.S.R.P.) - Supplementary Barrier Reef Island survey.

PERIOD: July 1982 -

ORGANIZATIONS: Queensland Tourist and Travel Corporation
Research and Regional Development Division,
P.O. Box 328,
Brisbane, Qld 4001

Cameron McNamara (consultants)
P.O. Box 94,
Spring Hill, Qld 4000

PROJECT LEADERS: Mr J. Weigh (07) 2210911
Mr R. O'Hara (07) 8349228

CONTACT OFFICER: Mr J. Weigh

OBJECTIVES

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 M.S.R.P. 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.

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 this first seven (7) months period of the survey to June 30, 1983 have been weighted up to represent results for the full year July 1982 to June 1983.
Results are also available for the four (4) quarters and full year period between July 1983 and June 30, 1984 and the survey is currently continuing throughout the 1984/85 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: Tourists/Attitudes/Sociological aspects/Surveys/

[QTTC--001]

197 Compilation of Fisheries Economics of the Great Barrier Reef.

PERIOD: May 1983 - December 1983

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

Griffith University (Subcontract)
Institute of Applied Social Research
Nathan, Qld 4111

PROJECT LEADERS: Dr W. Craik (077) 818811
Mr T. Hundloe (07) 2757111

CONTACT OFFICER: Ms S. Driml (077) 818811

MANPOWER: 0.20 (all years)

OBJECTIVE

To compile information on fisheries economics collected for the GBRMPA by the Institute of Applied Social Research into a single volume for publication.

METHODOLOGY

Data on the economics of commercial, recreational and charter boat fishing have been gathered by the consultant by interview and mail questionnaire, and economic analysis has been undertaken. The results have been presented in a number of reports to the GBRMPA. This project involves editing and interpreting the data and preparing a single volume on the entire Great Barrier Reef Region for publication.

STATUS

Text for a book was submitted to and accepted for publication by GBRMPA. Publication expected early 1985.

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: Fishing economics/Commercial fishing/Sports fishing/

[GBRMPA039]

198 Fish ladder design for Queensland coastal streams.

PERIOD: June 1980 -

ORGANIZATIONS: Queensland Water Resources Commission
Mineral House
George Street
Brisbane, Qld 4000

Queensland Fisheries Service
Transport House
The Valley Centre
230 Brunswick Street
Fortitude Valley, Qld 4006

University of Queensland
Zoology Department
St Lucia, Qld 4067

PROJECT LEADERS: Mr M.A. Wilke (07) 2247338
Dr B. Hill (07) 2244336
Mr I.C. Johnson (07) 3772474

CONTACT OFFICER: Mr P.K. McMahon (07) 2247338 (Queensland Water Resources Commission)

OBJECTIVES

To examine methods of allowing the ascent of juvenile catadromous fish up fishladders on Queensland coastal streams.
To examine internal operation of fish ladders.

METHODOLOGY

In laboratory, determine burst swimming speeds of juvenile fish, in particular of O+ *Mugil cephalus* , by live testing in orifice jet experimental apparatus. Test response and behaviour of fish with high velocity jet flow (around 1.0 to 1.5 m/s). Use results of fish swimming speeds as input data to testing scaled models of fish ladder steps and pools. Velocity measurements taken on model. Layout of internal ladder produced from this testing.

STATUS

Engineering input complete.
Biological work continuing at University of Queensland.

GEOGRAPHIC REGIONS: R,Q,X

MAJOR DESCRIPTORS: Fishways/Catadromous migrations/Juveniles/Mugilidae/ *Mugil cephalus* /

[QWRC--001]

See also: 179, 232*

199 Tropical rock lobster study.

PERIOD: February 1980 -

ORGANIZATIONS: CSIRO
Division of Fisheries Research
CSIRO Marine Laboratories
P.O. Box 20
North Beach, W.A. 6020

Department of Primary Industry
Fisheries Division
Edmund Barton Building
Canberra, A.C.T. 2600

PROJECT LEADERS: Dr B.F. Phillips (09) 4471388 (CSIRO)
Mr B.V. Lilburn

CONTACT OFFICER: Dr B.F. Phillips

EXPENDITURE: $224,000 (this year), $694,000 (all years)

MANPOWER: 3.00 (this year), 11.25 (all years)

OBJECTIVES

To carry out research into the stocks of tropical rock lobsters (*Panulirus ornatus*) in Torres Strait and northern Great Barrier Reef waters in order to provide the information necessary for management of the various fisheries.
In particular, to examine migrations, stock differentiation and assessment, fishing and natural mortalities of stocks, growth and recruitment.

METHODOLOGY

Catch and effort data are being collected from the various fisheries which take *Panulirus ornatus* .
Tagging of adults and juveniles.
Biological data such as length, stage of maturity and breeding information are collected by sampling.

STATUS

Tagging, in collaboration with Papua New Guinea fisheries authorities is being carried out in Torres Strait. Other studies proceeding.

CO-ORDINATION WITH OTHER PROJECTS

Collaboration with Fisheries Division, Department of Primary Industry, Port Moresby, Papua New Guinea.
Use of Queensland Fisheries Service facilities in Cairns.

GEOGRAPHIC REGIONS: J,R

SHIP TIME REQUIREMENTS: 4 months

MAJOR DESCRIPTORS: *Panulirus ornatus* /Stock assessment/Population dynamics/Malacostraca/Fishery management/

[CSIRO-054]

200 **An evaluation of economic and biological aspects of coral collecting in the Great Barrier Reef Marine Park.**

PERIOD: June 1983 - June 1985

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

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

PROJECT LEADERS: Dr W. Craik (077) 818811
Dr J. Baker (077) 814111
Mr J. Oliver
Prof M. Pichon

CONTACT OFFICER: Dr W. Craik

EXPENDITURE: $30,000 (this year), $82,230 (all years)

MANPOWER: 1.50 (this year), 3.00 (all years)

OBJECTIVES

To investigate aspects of the biology of principal commercial coral species of the Great Barrier Reef.
To determine the rates of production (supply) and collection to provide guidelines for harvesting and management.

METHODOLOGY

Biological research on production including distribution, abundance, size frequency, growth, reproductive strategies, mortality of harvested species using both experimental and lessees information.
Economic research into characteristics of commercial coral collection.

STATUS

Project well underway; field work in progesss and information being obtained from collectors.

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Corals/Commercial species/

[GBRMPA082]

201 **Central Section Survey - Great Barrier Reef.**

PERIOD: October 1984 - January 1985

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

Sea Research
PMB 1,
Daintree, Qld 4073

PROJECT LEADERS: Dr W. Craik (077) 818811
Dr A.M. Ayling (070) 986151

CONTACT OFFICER: Ms S. Driml (077) 818811

EXPENDITURE: $48,800 (this year), $48,800 (all years)

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

OBJECTIVE

To survey coral, coral trout and crown of thorns starfish in the Central Section of the Great Barrier Reef Marine Park.

METHODOLOGY
Survey, using straight line transects 50x20m (10 transects per reef) to obtain length-frequency data on coral trout. Manta towing of reefs to describe coral. Recording all observations of crown of thorns starfish. A minimum of 30 reefs in 4 cross shelf transects to be surveyed.

STATUS
Survey undertaken in November, 1984.

GEOGRAPHIC REGION: R
SHIP TIME REQUIREMENTS: 40 days
MAJOR DESCRIPTORS: *Plectropomus* spp./Stock assessment/Coral reefs/ *Acanthaster planci* / Distribution patterns/

[GBRMPA092]

202 Coral trout monitoring at Heron Island Reef.

PERIOD: June 1982 - October 1984
ORGANIZATIONS: Great Barrier Reef Marine Park Authority
P.O. Box 1379
Townsville, Qld 4810
Heron Island Research Station
Heron Island
Via Gladstone, Qld 4680
PROJECT LEADERS: Dr W. Craik (077) 818811
Ms M. Preker (079) 781399
Dr I. Lawn (079) 781399
CONTACT OFFICER: Ms E. Eager (077) 818811
EXPENDITURE: $300 (this year), $1,100 (all years)
MANPOWER: 0.10 (this year), 0.10 (all years)

OBJECTIVE
To collect and provide data on coral trout populations on a monthly basis to provide a numerical indication of the natural variability in such populations.

METHODOLOGY
Twelve monthly surveys by intensive scuba search technique will be made over a 150m transect at the unfished area of Heron Island Reef, previously surveyed in development of the technique.

STATUS
Surveys were undertaken from July 83 to June 84.

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: Heron Island
GEOGRAPHIC REGION: R
MAJOR DESCRIPTORS: Pisces/Population dynamics/Stock assessment/Coral reefs/

[GBRMPA075]

203 **Monitoring replenishment areas: coral trout survey techniques.**

PERIOD: April 1983 - October 1984

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

Queensland National Parks and Wildlife Service
P.O. Box 190
North Quay, Brisbane, Qld 4000

PROJECT LEADER: Dr W. Craik (077) 818811

EXPENDITURE: $10,000 (all years)

MANPOWER: .05 (this year), 0.15 (all years)

OBJECTIVE

To monitor coral trout communities in two replenishment areas Boult, North, Heron, Wreck and Llewellyn (restricted activities) and North West reefs, Capricornia Section.

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.

STATUS

Survey occurred in June 1983, just prior to closure of replenishment areas.

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: 7 days

MAJOR DESCRIPTORS: *Plectropoma leopardis* /Teleostei/Stock assessment/

[GBRMPA049]

204 **Reef fish tagging in the Capricornia Section of the Great Barrier Reef Marine Park.**

PERIOD: November 1980 -

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

Queensland National Parks and Wildlife Service
Maritime Estate Branch,
P.O. Box 190,
North Quay, Qld 4000

Giddins, Mr R.
C/- School of Biological Sciences,
James Cook University,
Townsville, Qld 4811

PROJECT LEADERS: Dr W. Craik (077) 818811
Mr G.W. Mercer (07) 2247750
Mr R. Giddins
Mr G.W. Mercer (07) 2276430

EXPENDITURE: $11,500 (this year), $32,500 (all years)

MANPOWER: 0.15 (this year), 0.40 (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 are caught by rod and line, tagged and released, and species, the area of capture, length of fish and date are recorded. Fishermen catching tagged fish are asked to return the tag with date and place of capture for $5.00 reward. Initial and subsequent recaptures are recorded to see if fish has moved. Other data (length, frequency, catch and effort) are recorded and analysed.

STATUS

By September 1984, over 7000 fishes of a variety of species had been tagged using lock on spaghetti tags. About 100 have been recaptured the majority in the vicinity of the tagging sites.
Data on length-frequency, species caught by reef, and effects of fishing conditions on catch have been analysed.
Further trips are proposed to investigate different tags, double tagging, catch rates, bait etc.

CO-ORDINATION WITH OTHER PROJECTS

This project relates to a coral trout survey project in which population of coral trout are evaluated at different reefs.

LOCALITY: Great Barrier Reef Marine Park - Capricornia Section
GEOGRAPHIC REGION: R
SHIP TIME REQUIREMENTS: 7
MAJOR DESCRIPTORS: Reef fish fisheries/Coral reefs/Migrations/Tagging/

[GBRMPA020]

205 Ecology and migratory pathways of the larvae of commercially important fish and decapod species in the continental shelf zone of the Great Barrier Reef.

PERIOD: - December 1983
ORGANIZATION: James Cook University of North Queensland
School of Biological Sciences
Post Office
Townsville, Qld 4811
PROJECT LEADERS: Dr R.F. Hartwick (077) 814272
Dr N.E. Milward (077) 814193
CONTACT OFFICER: Dr N.E. Milward
EXPENDITURE: $90,000 (all years)
MANPOWER: 5.00 (all years)
EXTERNAL SUPPORT: AMSTAC/MST - $86,777

OBJECTIVES

To determine spatial and temporal patterns of abundance and movements of larvae of commercially important fish and decapod species, and to obtain related data on larval production, feeding, growth, mortality and recruitment.
To use the information obtained for an elucidation of trophic relationships and of the spatial and temporal pathways which link the component habitats of the shelf system, from the coastal wet lands to the outer Barrier Reef.

METHODOLOGY

Plankton samples are being taken by a Tucker beam trawl, neuston sampler, and bongo net discrete depth sampler, during monthly cruises on the R.V. "James Kirby" from stations along four transect lines extending from the mainland to the Reef.
Samples are grossly analysed in terms of volume and dominant organisms present, and examined in detail for selected commercially important fish and decapod species.

STATUS

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

CO-ORDINATION WITH OTHER PROJECTS

Collaboration with project being conducted on reef fish larvae at Lizard Is. - Dr. J. Leis(Aust.Museum) and with the zooplankton program being carried out at AIMS under the supervision of Dr D. McB. Williams.

LOCALITY: Townsville

GEOGRAPHIC REGION: R

SHIP TIME REQUIREMENTS: 12

MAJOR DESCRIPTORS: Larvae/Osteichthyes/Shellfish fisheries/Migrations/Biological surveys/

[JAMESC012]

206 Life history parameters and reproductive biology of the dugong.

PERIOD: November 1981 - December 1984

ORGANIZATION: James Cook University of North Queensland
Department of Zoology
Post Office
Townsville, Qld 4811

PROJECT LEADER: Dr H.D. Marsh (077) 814242

EXPENDITURE: $34,372 (this year), $59,376 (all years)

MANPOWER: 1.10 (this year), 2.70 (all years)

EXTERNAL SUPPORT: AMSTAC-FAP - $95,757

OBJECTIVE

To assist in the development of biologically-sound management programmes for dugongs by assessing the impact of hunting by indigenous people on dugong numbers in the northern Great Barrier Reef/Torres Strait area. This will be done by (a) determining the age and sex structure, maximum longevity, pre-reproductive period, age-specific fecundity, mortality and breeding pattern of the dugongs feeding on Warrior Reef; and (b) using these data to construct a population model to estimate the effect of the present level of hunting on dugong numbers in this area.

METHODOLOGY

In 1978, the Papua New Guinea Division of Wildlife established a conservation and management programme for dugongs which led to the establishment of the Maza Wildlife Management Area centred at Daru in Torres Strait. Since June 1978, all dugongs caught for sale at Daru market have had to be examined and sampled by Wildlife Division staff. Under this scheme data and specimens have been obtained from over 400 dugongs in 3 years. Most have been examined within five hours of death. These specimens will be processed for age determination and reproductive studies. The age of each dugong will be determined by counting the dentinal growth layers in the tusk. The terminal reproductive state of each male will be determined by histological study of tissue specimens taken from testes and epididymides. The terminal reproductive state of each female will be determined by gross and histological study of the mammary glands, uterus and ovaries. The reproductive history of each female will be determined by counting corpora albicantia and endometrial placental scars.

STATUS

All specimens have now been processed as planned and the data have been entered into a computer for analysis. Preliminary analyses indicate significant changes in pre-reproductive period, reproductive activity and recruitment in different years of the study. A simple population model has been developed. When viewed in the light of the information on

dugong population size for Torres Strait and northern Great Barrier Reef, the data suggest that dugongs have recently been seriously over-exploited in this area.

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

Aerial survey to estimate dugong distributon and abundance in Torres Strait funded by Australian National Parks and Wildlife Survey in November 1983.

GEOGRAPHIC REGIONS: T,R

MAJOR DESCRIPTORS: *Dugong* /Sirenia/Population dynamics/Resource exploitation/Resource management/

[JAMESC046]

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207 **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: Osteichthyes/Life history/Fishery surveys/Check lists/

[JAMESC013]

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208 **A study of the sand crab *Portunus pelagicus* and its exploitation in a subtropical multi-sector fishery.**

PERIOD: July 1984 - June 1986

ORGANIZATION: Queensland Department of Primary Industries
Southern Fisheries Research Centre,
PO Box 76,
Deception Bay, Qld. 4508

PROJECT LEADER: Mr M.A. Potter (07) 2031444

EXPENDITURE: $96,020 (this year), $185,000 (all years)

MANPOWER: 2.80 (this year), 5.60 (all years)

EXTERNAL SUPPORT: FIRTA - $68,000

OBJECTIVE

To assess the status of the Moreton Bay sand crab stocks and prepare recommendations for the management of the fishery.

METHODOLOGY

Data is being collected by:
1. field sampling of commercial pot crab catches;
2. field sampling of trawl catches with a research trawler;
3. a research logbook program; and
4. tagging studies.

STATUS

Field sampling commenced in October 1984 after some preliminary design and methodology work. Approximately 50% of pot crabbers are participating in a voluntary logbook program. Tagging of crabs in the field is planned to commence in March 1985.

CO-ORDINATION WITH OTHER PROJECTS

DPI Fish Management Branch - Survey of amateur crab catches,
DPI Dairy Research Branch - Study of post harvest "mushiness" in sand crabs.

LOCALITY: Moreton Bay

GEOGRAPHIC REGION: R

SHIP TIME REQUIREMENTS: 72 days of research vessel time.

MAJOR DESCRIPTORS: *Portunus pelagicus* /Malacostraca/Fishery management/

[QDPI--025]

209* **Application of remote-sensing techniques for the assessment of fish habitat areas.**

PERIOD: January 1975 -

ORGANIZATION: Queensland Department of Primary Industries
Estuarine & Foreshore Management Section
P.O. Box 46
Brisbane, Qld 4000

PROJECT LEADERS: Mr D. Mayer (07) 2276428
Mr B.R. Pollock (07) 2276429

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.

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/

[QDPI--019]

210 Assessment of the east Queensland inshore commercial gill net fishery.

PERIOD: July 1981 - December 1984
ORGANIZATION: Queensland Department of Primary Industries
Fisheries Research Station
c/- P.O.
Burnett Heads, Qld 4670
PROJECT LEADER: Mr D.J. Russell (071) 794155
EXPENDITURE: $41,600 (this year), $123,500 (all years)
MANPOWER: 2.50 (this year), 7.00 (all years)
EXTERNAL SUPPORT: FIRTA - $123,500

OBJECTIVES

1. To document the catch composition of the commercial inshore net fishery with respect to species, sizes of fish, seasonality and habitat.
2. To determine the effect of current gear-restrictions and seasonal closures on catch composition and commercial viability of net-fishing operations.
3. To investigate alternative strategies for management.

METHODOLOGY

A series of field study sites were chosen in the region Cairns to Bundaberg and sampled monthly using experimental gill nets. A voluntary catch log book scheme was also implemented amongst commercial fisherman operating in the study area.

STATUS

A field sampling programme, undertaken in estuaries between Cairns and Bundaberg has now been completed and data analysed. The voluntary catch log book scheme has also been finalised.

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: Coastal fisheries/Gillnets/Potential resources/Fishery data/Fishery management/

[QDPI--002]

211* Biology and management of *Trochus niloticus* .

PERIOD: September 1982 - September 1984

ORGANIZATIONS: Queensland Department of Primary Industries
Queensland Fisheries Service
C/- P.O.
Bungalow, Qld 4870

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

PROJECT LEADERS: Mr R.G. Pearson (07) 2276432
Dr W. Craik (077) 712191

CONTACT OFFICER: Mr W. Nash (070) 515588 or 516662

EXPENDITURE: $13,625 (this year), $38,151 (all years)

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

OBJECTIVE

To determine the basic biology, reproduction, recruitment, growth, population structure and the sustainable, harvestable yield of trochus, and management principles for a possible collection fishery within the Great Barrier Reef Marine Park.

METHODOLOGY

1. To survey trochus populations in both the Cairns and Mackay regions to determine population densities, size frequency distributions, and distribution in relation to habitat.
2. To undertake basic biological studies, including growth rate (by tag-recapture), reproduction (breeding periods, spawning frequency, spawning behaviour, fecundity, size/age at maturity), and movement (in relation to recruitment into depleted areas).
3. To accompany trochus fishermen to (i) observe collecting and processing methods, and (ii) obtain estimates of the catch per unit effort on a variety of reefs, and see how this changes with repeated collecting.

STATUS

1. Significant differences in shell morphology exist between some populations. In general, Mackay trochus do not grow as large as Cairns trochus. High density (ie, commercially exploitable) populations tend to consist of small trochus with thick shells. Transplantation of stunted trochus to Cairns reef has been initiated to see if this stunting is reversible. Caging experiments to test for different growth rates at different densities are also underway.
2. Cairns trochus spawn monthly, generally 2-3 days after the new moon. Spawning is initiated by males, and females follow with a brief spawning interval of 10-15 minutes. Trochus have been successfully reared past metamorphosis. Histological analysis of the gonads of Mackay populations suggests that spawning may occur less frequently there than on the Cairns reef.
3. Growth rates are generally inversely related to shell size, although there is high variability within each size class.

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: *Trochus* /Gastropoda/Pearl fisheries/Population dynamics/Fishery data/

[QDPI--004]

212 Demersal reef fish biology.

PERIOD: July 1980 - June 1985

ORGANIZATION: Queensland Department of Primary Industries
Northern Fisheries Research Centre,
C/- Post Office,
Bungalow, Qld 4870

PROJECT LEADERS: Dr G.B. Goeden (070) 515588
Mr G.R. McPherson (070) 515588

CONTACT OFFICER: Dr G.B. Goeden

EXPENDITURE: $20,110 (this year), $50,000 (all years)

MANPOWER: 2.50 (this year), 10.00 (all years)

EXTERNAL SUPPORT: GBRMPA - $16,110

OBJECTIVE

To establish the age and growth rates of several commercial and recreational demersal reef fishes collected in the Cairns section of the Great Barrier Reef Marine Park.

METHODOLOGY

Specimen material is collected using a variety of fishing techniques and through purchases of carcasses from commercial fishermen. Examination of gonad histological material and boney parts will allow relationships between age, sex and size to be revealed using standard techniques.

STATUS

To date more than 2600 specimens have been collected including Lutjanids, Lethrinids and Serranids. All have been measured and weighed as required and Gonads, Otoliths and Urohyals have been removed. Gonad material is currently in section form and is under study together with the Otolith material.

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Demersal fisheries/Life history/Growth/Reproduction (biological)/

[QDPI--018]

213* **Northern Queensland inshore gill-net fisheries management study.**

PERIOD: July 1981 - June 1984

ORGANIZATION: Queensland Department of Primary Industries
Northern Fisheries Research Centre
Post Office
Bungalow, Qld 4870

PROJECT LEADER: Mr R.N. Garrett (070) 515588

OBJECTIVE

To determine the effectiveness of current management programmes and, if necessary, to indicate areas for modification.

METHODOLOGY

1. Monitoring commercial fishery through catch per unit effort data.
2. Monitoring resource stocks with respect to seasonal distribution and abundance via commercial catch sampling and research gill-netting programmes in major fishery areas of the southeastern Gulf of Carpentaria (Karumba region), northeast Gulf (Weipa region) and northeast Queensland coast (Princess Charlotte Bay).

STATUS

Compulsory monthly catch log programme introduced for commercial fishermen from February 1981.
1981-82 and 1982-83 resource surveys in representative habitats 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.

LOCALITIES: Karumba; Weipa; Princess Charlotte Bay

GEOGRAPHIC REGIONS: C,R

MAJOR DESCRIPTORS: Coastal fisheries/Gillnets/Potential resources/Fishery data/Fishery management/

[QDPI--005]

214 **Outer Reef Slope Dropline Fishery.**

PERIOD: October 1984 -

ORGANIZATION: Queensland Department of Primary Industries
Fisheries Research Branch,
Northern Fisheries Research Centre,
C/- Post Office,
Bungalow, Qld 4870

PROJECT LEADER: Mr G. McPherson (070) 515588

EXPENDITURE: $6,000 (this year)

MANPOWER: 3.00 (this year)

OBJECTIVES

To record a species list of outer reef slope fish species.
To establish the available fishing area within the 160-400 metre (approximate) range off Cairns.
To assess the feasability of dropline fishing techniques in the region.

METHODOLOGY

Standard dropline fishing techniques as developed within the South Pacific Commission region using various hand reel designs.

GEOGRAPHIC REGION: R

SHIP TIME REQUIREMENTS: 25 days

MAJOR DESCRIPTORS: Reef fish fisheries/Fishery data/Fishery management/Fishing operations/

[QDPI--021]

215* **Stream and estuarine inventory and classification in relation to fish populations.**

PERIOD: January 1975 -

ORGANIZATION: Queensland Department of Primary Industries
Estuarine and Foreshore Management Section
P.O. Box 46
Brisbane, Qld 4000

PROJECT LEADER: Dr J. Beumer (07) 2276425

CONTACT OFFICER: Mr D. Mayer (07) 2276428

EXPENDITURE: $20,000 (this year), $50,000 (all years)

MANPOWER: 3.50 (this year), 20.00 (all years)

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 resouces-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 compatible with fisheries and areas in which management is primarily 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 and coastal development is an on- going function of this project team.

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,N

SHIP TIME REQUIREMENTS: 20 days

MAJOR DESCRIPTORS: Fishery resources/Coastal zone management/Estuaries/Rivers/

[QPDI--020]

216 Studies on the Trawl Fishery for Red-spot King Prawns (*Penaeus longistylis*) in the Great Barrier Reef Region.

PERIOD: 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: $140,000 (this year), $454,000 (all years)

MANPOWER: 6.75 (this year), 20.00 (all years)

EXTERNAL SUPPORT: FIRTA - $315,000 (3 years)
GBRMPA - $79,000 (3 years)

OBJECTIVES

1. To obtain data on the life cycle of *P. longistylis* .
2. To obtain data on the by-catch taken in the existing fishery, and compare by-catch fauna with described reef and inter reef faunas.
3. Describe population parameters of *P. longistylis* from catch/effort data and tag data for incorporation in production/ yield per recruit models.

METHODOLOGY

1. Series of cruises/collections to establish distribution/abundance/ size composition/reproductive status of *P. longistylis* in a number of estuarine and offshore sites.
2. Collections of "trash" will be taken from both research and commercial trawl operations. Samples will be frozen, and later sorted and identified at Northern Research Centre. Data will be collated and literature search and further analysis will be conducted to compare trash fauna with others.
3. Monitor total landings, size composition and average catch rate over as long a period as possible. Conduct a mass-tag release immediately prior to recruitment and monitor total prawn catch and tag returns subsequently.

STATUS

Project being initiated. Catch/effort data coming from 40+ fishermen, and landing data being received from all major processors.
Preliminaries to determine estuarine sample sites have been completed, and data on net selection /avoidance of a *Penaeus* sp. closely related to *P. longistylis* have been collected.

GEOGRAPHIC REGION: R

SHIP TIME REQUIREMENTS: 40 days

MAJOR DESCRIPTORS: *Penaeus longistylis* /Trawling/Stock assessment/Life cycle/Population dynamics/

[QDPI--022]

217 **The impact of trolling in buffer zones of the Great Barrier Reef Marine Park.**

PERIOD: July 1984 - June 1985

ORGANIZATION: Queensland Department of Primary Industries
Fisheries Research Branch,
Northern Fisheries Research Centre,
C/- Post Office,
Bungalow, Qld 4870

PROJECT LEADER: Dr G.B. Goeden (070) 515588

EXPENDITURE: $10,685 (this year), $10,685 (all years)

EXTERNAL SUPPORT: GBRMPA - $4,685

OBJECTIVE

To establish the species composition of fishes caught using commercial trolling methods in the Green Island - Arlington reef complex in relation to both depth and distance from the reef edge.

METHODOLOGY

The programme includes both troll fishing during which detailed data for each capture will be recorded (including species, depth, time of day, distance from reef, length, sex, gut contents) and a log book programme conducted within the commercial troll fishery (providing species composition, depth, time data).

STATUS

Biological material is now being collected and a suitable log book is in preparation.

LOCALITY: Green Island

GEOGRAPHIC REGION: R

SHIP TIME REQUIREMENTS: 84 days

MAJOR DESCRIPTORS: Fishery surveys/Fishing operations/Stock assessment/

[QDPI--023]

218 **Stock identification and discrimination of commerically important whitings (Teleostii; Sillaginidae) in Australian waters using genetic criteria.**

PERIOD: July 1983 - December 1986

ORGANIZATION: University of New South Wales
School of Zoology
P.O. Box 1
Kensington, N.S.W. 2033

PROJECT LEADERS: Dr P.I. Dixon (02) 6972112
Dr R.H. Crozier (02) 6972119

CONTACT OFFICER: Dr P.I. Dixon

EXPENDITURE: $31,100 (this year), $75,000 (all years)

MANPOWER: 1.20 (this year), 3.50 (all years)

EXTERNAL SUPPORT: FIRTA - $31,000

OBJECTIVE

The project investigates the population structure of the whitings *Sillago ciliata* , *Sillago maculata* , *Sillago bassensis* and *Sillaginodes punctatus* , using allozymes detected by electrophoresis as genetic markers. Locations within the range of each species will be sampled by beach seine, angling, and with commerical and amateur fishermen. Allele frequency heterogeneity between sexes, age classes, and seasons will be examined. Geographic variation in morphological characteristics will be examined concurrently with electrophoretic analysis. Possible extensions of this program will be to identify larval stages using electrophoresis and attempt aging to determine dispersal potential; and to investigate hybridization between *S. ciliata* and *Sillago analis* .

METHODOLOGY

It has been shown that racial differentiation within a species range often has a genetic component which may be attributable to restricted gene flow and localized adaptation. The potential of enzyme polymorhisms in fisheries population studies has been applied to stock identification problems in a number of commercially important vertebrates and invertebrates. We will be using these techniques in this project.

STATUS

1. Method Development. The suitability of our methods for use with whitings have been checked. Some methods have been modified to improve the resolution of the different enzyme variants. Starch gels, Cellogel and Titan III plates have been used.
2. Investigation of Enzyme Polymorphism in Whitings. One population of each of the above species has been used to determine which enzymes are polymorphic. Between 30 and 60 presumptive loci have been investigated in each species. All species show clean genetic polymorphisms at some loci. These loci will form the basis of the stock indentification programme. Each species has at lease four such loci which stain consistently are relatively stable and give clear result. Fixed differences have been found between all species. Comparisons have been made between populations of *S. bassensis* from St Vincents Gulf, S.A., and Eden, N.S.W. Several fixed differences occur in fish from these two localities. This is a most important finding because it indicates that the eastern and western forms of *S. bassensis* which for some time have been regarded as probable sup-species, are in fact distinct species.

CO-ORDINATION WITH OTHER PROJECTS

We are co-ordinating our activities with N.S.W. Dept. of Agriculture, Victorian Fisheries and Wildlife division and the S. Aust. Department of Fisheries.

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

MAJOR DESCRIPTORS: Sillaginidae/Teleostei/Stock identification/Commercial species/Genetics/

[UNINSW018]

See also: 145*, 161

219 **Survey of Charter Boats, Great Barrier Reef Region: Stage 1.**

PERIOD: May 1984 - October 1984

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

Griffith University
Institute of Applied Social Research,
Nathan, Qld 4111

PROJECT LEADERS: Dr W. Craik (077) 818811
Mr T. Hundloe (07) 275 7444

CONTACT OFFICER: Ms S. Driml (077) 818811

EXPENDITURE: $1,500 (this year), $14,980 (all years)

MANPOWER: 0.20 (this year), 0.30 (all years)

OBJECTIVE

To design and conduct a survey of Charter Boats operating in the Great Barrier Reef Region to investigate activity patterns, fish catch and economic characteristics. (Stage 1 is limited to the Townsville and Whitsunday areas).

METHODOLOGY

A questionnaire will be developed in conjunction with GBRMPA staff and surveys by personal interview of charter boat operators will be conducted.

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: Tourism economics/Fishery surveys/Recreation surveys/

[GBRMPA104]

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220 **Traditional uses of Marine Resources by Aboriginal Communities on the East Coast of Cape York Peninsula: Stage 1.**

PERIOD: October 1983 - June 1985

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,
Department of Marine Biology, and Department of Behavioural Sciences,
Post Office,
James Cook University,
Townsville, Qld. 4811

PROJECT LEADERS: Dr W. Craik (077) 818811
Mr A. Smith (077) 814111

CONTACT OFFICER: Ms S. Driml (077) 818811

EXPENDITURE: $6,000 (this year), $47,600 (all years)

MANPOWER: 1.00 (this year), 1.50 (all years)

OBJECTIVE

To document the current and traditional hunting and fishing practices of the Hope Vale Aboriginal Community. To acquire indigenous knowledge of the biology and behaviour of tropical marine food resources. To utilise this information in the development of a management program for Aboriginal use of marine resources within the Great Barrier Reef Marine Park.

METHODOLOGY

Field work for 15 months in the Hope Vale Community will include personal observation, participation, and interview. Library searches will be under taken in Canberra, Brisbane and Townsville.

STATUS

A major report is due in June 1985. Several progress reports have been submitted.

LOCALITY: Hope Vale

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Fishery resources/Aborigines/Fishing operations/Sociological aspects/

[GBRMPA088]

221 Development of barramundi *Lates calcarifer* (Bloch) hatchery and farming techniques.

PERIOD: July 1983 -

ORGANIZATIONS: Sea Hatcheries
3 Pine Tree Close
Bayview Heights
Cairns, Qld 4870

Ryall, J.C.
C/- Post Office
Gordonvale, Qld 4865

PROJECT LEADERS: Dr M.P. Heasman (070) 514959
Mr R.C. Ryall A/H (070) 543387

CONTACT OFFICER: Dr M.P. Heasman

EXPENDITURE: $179,350 (this year)

MANPOWER: 2.00 (this year)

EXTERNAL SUPPORT: FIRTA - $148,500 (1983/85)

OBJECTIVES

1. To identify major practical constraints to the development of a commercially viable barramundi hatchery and farming enterprise in Northern Australia.
2. To use this practical experience in formulating a longer term cost and time efficient program of research and development.
3. To demonstrate that hatchery rearing of native barramundi constitutes a practical alternative to importation of exotic species such as nile perch (*Lates niloticus*) as a means of improving freshwater angling in Queensland.
4. To identify simple low cost techniques enabling routine small scale production of larval and post-larval barramundi for research purposes.
5. To assess the utility of hatchery and cage reared barramundi as the basis of a recreational/tourist angling enterprise.

METHODOLOGY

A research hatchery/laboratory was established in Cairns during 1983/84. Broodstock of a dwarf race of *L. calcarifer* collected from Weipa in June 1984 will be subjected to spawning induction trails during the 1984/85 breeding season. Information on the time and location of spawning of wild barramundi gained during the 1983/84 breeding season will be used to facilitate collection of ripe running fish during the current 1984/85 spawning season. Cost and labour efficient techniques and equipment for the mass culture of larval food and for larval juvenile *L. calcarifer* developed in 1983/84 will be expanded and refined in 1984/85.

CO-ORDINATION WITH OTHER PROJECTS

Commonwealth Department Primary Industry, AIMS; James Cook University.

GEOGRAPHIC REGIONS: R,J,C

MAJOR DESCRIPTORS: *Lates calcarifer* /Latidae/Hatcheries/Fishery development/

[SEAHAT001]

222 Engineering properties of coral reefs.

PERIOD: October 1980 - December 1984

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

PROJECT LEADER: Assoc Prof H. Bock (077) 814431

EXPENDITURE: $22,410 (this year), $38,580 (all years)

MANPOWER: 1.50 (this year), 3.50 (all years)

EXTERNAL SUPPORT: AMSTAC-FAP - $38,580
GBRMPA - $3,070

OBJECTIVE

Determination of geomechanical properties and delineation of principle structure of the near-surface underground (down to a depth of about 30M) of coral reef.

METHODOLOGY

Previous research has demonstrated that dynamic probing, particularly a german version of it, is at present one of the best site investigation techniques on coral reefs, as it is a very quick testing method which provides continuous quantitative records over the depth of penetration. In some situations, however dynamic probing is not easily possible due to hard coralline layers. As part of this research project, the probing technique was modified to cope with this problem. A significant increase in the probing capability of the equipment was gained by use of some elements of percussion drilling. This involved the use of cross-chisel inserts in the probing drive points and rotation of the rod string during probing.

STATUS

A total of 84 dynamic probing tests were carried out in four different regions of the Great Barrier Reef Region. A cross-section approximately 60 to 90 KM NE Townsville with keeper-, grub- and bowl-reefs was most thoroughly investigated. Particular attention was given to what, from the dynamic probing record, was inferred to be the Holocene/ pleistocene solution unconformity. The data from both grub- and keeper-reefs suggests a rise by a few metres in the elevation of the unconformity at the reef front from an average depth of about -20M. The data from bowl-reef is less consistent with this trend, however, its data basis is not as broad as for the other two reefs.
Another aspect of the research was correlation of the dynamic probing technique and engineering properties of coralline materials. In laboratory tests rather unusual engineering properties were found with respect to rather high modulus ratios and unusually low point load strength indices.

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

GEOGRAPHIC REGION: R

SHIP TIME REQUIREMENTS: 16 days

MAJOR DESCRIPTORS: Construction/Foundations/Coral reefs/

[JAMESC001]

223 Gladstone Harbour Model.

PERIOD: December 1981 - December 1984

ORGANIZATION: Queensland Department of Harbours and Marine
Queensland Government Hydraulics Laboratory
P.O. Box 2195
Brisbane, Qld 4001

PROJECT LEADERS: Mr D.A. Robinson (07) 2278856
Mr R. McGuire (07) 2278856

CONTACT OFFICER: Mr D.A. Robinson

EXTERNAL SUPPORT: Gladstone Harbour Board

OBJECTIVES

1. To examine the pattern of tidal current patterns around major wharves in Gladstone Harbour under various tidal conditions.
2. To investigate ways of improving conditions to allow safe mooring of ships at these berths.
3. To consider effects of future harbour dredging and reclamation schemes on the tidal current patterns near the wharves.

METHODOLOGY

Extensive tidal current data collection in the field to calibrate physical model. Physical hydraulic model constructed at 1:100 vertical scale and 1:200 horizontal scale.
Fixed-bed, steady-state model represents 4000 ha of Gladstone Harbour, and covers 1000 m^2.
Current patterns in model in the area of interest are correctly simulated by using scaled wharf structures and 3 scale ship models of 140,000 DWT, 107,000 DWT and 70,000 DWT respectively.

STATUS

The model was constructed in September 1982. Calibration of the model to July 1978 conditions was completed in April 1983.

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

Calibration and operation of the model is undertaken using discharges predicted by numerical modelling carried out by Oceanics Australia Pty Ltd with their 'ESTRY' network model.

LOCALITY: Gladstone

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Tidal currents/Harbours/Mooring systems/Ships/

[QDHM--005]

See: 206

224 Resource Inventory, Far Southern Area, Great Barrier Reef.

PERIOD: April 1984 - November 1984

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

Australian Littoral Society
P.O. Box 498,
Toowong, Qld 4066

PROJECT LEADERS: Dr W. Craik (077) 818811
Mr E. Hegerl (07) 485235

CONTACT OFFICER: Ms S. Driml (077) 818811

EXPENDITURE: $750 (this year), $7,550 (all years)

MANPOWER: 0.15 (this year), 0.25 (all years)

OBJECTIVE

To extend the existing Great Barrier Reef Inventory to the southern extent of the Region. To provide physical and biological descriptions of reefs and islands and information on human use.

METHODOLOGY

Information on physical characteristics, usage levels etc. from a review of literature and search of government records is indexed in a form consistent with the Great Barrier Reef Gazetteer Information is provided separately for each reef and cay.

STATUS

A draft inventory has been 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: Reefs/Islands/Cays/Mapping/Resource inventories/

[GBRMPA086]

225 Assessment of Impacts Associated with the Construction of Navigation Aids.

PERIOD: September 1984 - November 1984

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

Sea Research
PMB 1,
Daintree, Qld 4873

PROJECT LEADERS: Dr W. Craik (077) 818811
Dr A.M. Ayling (070) 986151

CONTACT OFFICER: Mr I.M. Dutton (077) 818811

EXPENDITURE: $4,300 (this year), $4,300 (all years)

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

OBJECTIVES

1. To survey and identify the physical and biological impacts caused by construction of navigation facilities in the Hydrographers Passage area.
2. To advise on further studies which may be appropriate to assess longer term impacts and possible measures which may be used to amelicrate impacts arising from similar future projects.

METHODOLOGY

Two areas were surveyed in the immediate vicinity of construction sites on Little Bugatti and White Tip Reefs and two others near a proposed site on Creal Reef. Encrusting organisms were measured using 20m line transects, sedentary invertebrates using random 20x0.5m transects, *Chaedodontidae* and *Plectropomus* spp using 50x20m transect and non-secretive reef fish using a 10x50m transect.

STATUS

A preliminary report has been submitted. The report notes that construction of the navigation towers will probably not have any significant long term effect on the reef environment, although some localised damage due to construction activities was recorded.

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: Hydrographers Passage; Little Bugatti Reef; White Tip Reef; Creal Reef

GEOGRAPHIC REGION: R

SHIP TIME REQUIREMENTS: 5

MAJOR DESCRIPTORS: Construction/Navigation towers/Environmental impact/Reefs/

[GBRMPA093]

226 History of Crown of Thorns Incidence on the Great Barrier Reef.

PERIOD: January 1982 - December 1983

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

James Cook University of North Queensland (Subcontract)
History Department
P.O. James Cook University
Qld, 4811

PROJECT LEADERS: Dr W. Craik (077) 818811
Prof. B.J. Dalton (077) 814111

CONTACT OFFICER: Dr W. Craik

EXPENDITURE: $26,200 (all years)

MANPOWER: 1.50 (all years)

OBJECTIVE

To collect material related to historical use and frequency of events in the Great Barrier Reef Region, with particular reference to the incidence of Crown of Thorns starfish.

METHODOLOGY

Information will be collected by (1) conducting interviews using a standard format with long-time residents of areas adjacent to the Great Barrier Reef Region; (2) a literature search to extend contacts and collect written information; and (3) cross checking oral information on events with timing of other events and the written record.

STATUS

Final report submitted to 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.

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: *Acanthaster planci* /Asteroidea/Pest control/History/

[GBRMPA037]

227 The Impact of Reef walking at Hardy Reef.

PERIOD: June 1984 - October 1984

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

Griffith University
School of Australian Environmental Studies,
Nathan, Qld 4111

PROJECT LEADERS: Dr W. Craik (077) 818811
Dr A. Kay (07) 2757111
Dr M. Liddle

CONTACT OFFICER: Mr I.M. Dutton (077) 818811

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

MANPOWER: 0.40 (this year), 0.40 (all years)

OBJECTIVES

To quantify, map and describe existing and future levels and patterns of reef walking at Hardy Reef.

To assess the nature and degree of physical and biological impact associated with present and anticipated future reef walking use levels at Hardy Reef.

To compare the type, nature and levels of reef walking damage recorded at Hardy Reef with those previously recorded at Heron Island Reef and determine whether there are any major differences or features not previously observed.
To evaluate techniques for reef walking impact/damage assessment which were used in the Heron Island study, and determine their adequacy and applicability in the context of Hardy Reef.

METHODOLOGY
Project involved field reconaissance and survey of Hardy Reef followed by a desk-top study.

STATUS
Report submitted to GBRMPA currently being reviewed by external assessers. Project found that the current level of reef walking use of Hardy Reef is approximately 30-40,000 people/annum. No obvious signs of trampling damage on the reef were observed, except along the lagoon edge where disembarkation occurs. A morphology substrate scheme developed during an earlier study, at Heron Island was found to be a suitable frame work for assessment of reef walking damage. A further study documenting the scheme is proposed.

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: Hardy Reef
GEOGRAPHIC REGION: R
MAJOR DESCRIPTORS: Reefs/Walking/Damage/Environmental impact/Tourists/

[GBRMPA099]

228 Tourist impact on reef corals.

PERIOD: February 1982 - March 1984
ORGANIZATIONS: Great Barrier Reef Marine Park Authority
P.O. Box 1379
Townsville, Qld 4810
Griffith University (Subcontract)
Nathan, Qld 4111
PROJECT LEADERS: Dr W. Craik (077) 818811
Dr M. Liddle (07) 2757111
Dr A. Kay
CONTACT OFFICER: Mr R. Kenchington (077) 818811
EXPENDITURE: $59,849 (all years)
MANPOWER: 2.00 (all years)

OBJECTIVE
To determine the effects of human trampling on intertidal coral communities typically visited by reef walkers.

METHODOLOGY
The amount of broken coral and the identity and abundance of sessile animal and plant species on untrampled pathways trampled to various degrees is being compared in a trampling experiment over a period of 18 months.
Cordoned-off plots designed to keep people from walking on certain areas of coral are positioned in the region visited by the guided reef walks from the Heron Island resort. Comparison of the coral breakage and composition inside and outside of these plots will be made over a period of 18 months to determine whether this area has been affected by the

high numbers of people who visit it.
The ability of four common reef flat corals to survive and recover after human trampling will be assessed in a third series of experiments which will be designed to determine such things as the amount of force required to break the coral skeleton and the growth rate and survival rate of dislodged coral fragments and damaged colonies.

STATUS
Final report submitted to GBRMPA.
A scheme based on morphology/substrate has been developed which can be used to rank different sites on a scale of vulnerability to trampling damage. Journal articles have been prepared.

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/Damage/Tourists/

[GBRMPA071]

229 Workshop on contaminants in waters of the Great Barrier Reef.

PERIOD: May 1984 - June 1985
ORGANIZATION: Great Barrier Reef Marine Park Authority
P.O. Box 1379,
Townsville, Qld 4810
PROJECT LEADER: Dr A.J. Gilmour (077) 712191
CONTACT OFFICER: Mr I.M. Dutton (077) 818811
EXPENDITURE: $10,592 (this year), $10,592 (all years)
MANPOWER: 0.20 (this year), 0.20 (all years)

OBJECTIVES
1. To receive and discuss the findings of recent contaminant research studies in the Great Barrier Reef Region, considering in particular: (i) sampling design and methods; (ii) analytical techniques; (iii) comparative national and international levels and their significance; and (iv) the degree of threat which the measured levels are believed to pose to organisms and ecosystems of the Reef.
2. To determine what critical information deficiencies (if any) exist in relation to our understanding of the service, level and fate of marine contaminants in the Region, and to determine how these could be overcome.
3. On the basis of (1) and (2) above, to determine priorities for further research in this field and how further research effort could best be co-ordinated. This should include consideration of parameter selection; design, techniques and frequency of sampling; analytical methods and intercalibration; and how spatial and temporal variability may influence the design of cost-effective research.

METHODOLOGY
A workshop involving some 35 invited participants was held at Griffith University on May 26, 1984. The three main groups of contaminants discussed were heavy metals, polychlorinated biphenyls and other organochlorines, and hydrocarbons.

STATUS
A draft report of proceedings has been prepared and if accepted by the GBRMPA may be published as part of the Authority's research publications.

GEOGRAPHIC REGION: R
MAJOR DESCRIPTORS: Water quality/Pollution monitoring/Heavy metals/PCB/

[GBRMPA080]

230 **Workshop: Response to Hazardous Chemical Spills in the Great Barrier Reef Region.**

PERIOD: July 1984 - June 1985

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

PROJECT LEADER: Dr W. Craik (077) 818811

EXPENDITURE: $3,000 (this year), $3,000 (all years)

MANPOWER: 0.01 (this year), 0.01 (all years)

OBJECTIVE

To examine the necessity and feasibility of establishing a response capability, particularly a scientific response capability, for hazardous chemical spills in the Great Barrier Reef Region.

METHODOLOGY

Conduct a workshop of appropriate experts and government officials to explain problems and seek their views and information.

STATUS

Workshop held 3 August 1984 - Townsville. Workshop report in preparation.

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Pollution control/Hazardous chemicals/

[GBRMPA083]

231 **Chemical and biological processes associated with oil spills in tropical waters.**

PERIOD: January 1983 -

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

PROJECT LEADERS: Dr J.T. Baker (077) 814111
Dr J.L. Reichelt (02) 932247 or (077) 814111
Dr P.T. Murphy (077) 814111

CONTACT OFFICER: Dr J.T. Baker

EXTERNAL SUPPORT: QFMRAAC/MSTGS - $194,428 (1983 : 68530; 1984 : 71941; 1985 : 53957)
Partial overseas (private fund) - $29,000

OBJECTIVE

To determine existing "background" levels of oil in tropical waters - harbours, shipping channels, near-reef and mangrove areas, to characterize oil types, to detect movement of oil in the water and in transport to sediment and selected marine organisms. Studies will include the physical and chemical changes of different oils with time and pay particular attention to the role of, and impact on, microalgae and marine bacteria when oil spills occur in chronic or acute situations. The impact of approved oil-dispersants will be studied in different situations.

METHODOLOGY

Samples of all commercial oils have been obtained as standards. Water and sediment samples are being collected in regions in the vicinity of Ports of Cairns and of Townsville. Samples are analyzed by g.c. and h.p.l.c. techniques. Microalgae and marine bacteria are identified at sample sites and hydrocarbon-metabolizing microorganisms studied under laboratory conditions. Microorganisms will also be grown in aquaria conditions and

controlled experiments effected.

GEOGRAPHIC REGION: R

SHIP TIME REQUIREMENTS: 12 days

MAJOR DESCRIPTORS: Oil spills/Environmental impact/Pollution effects/

[JAMESC068]

232* Pilot study: National monitoring programme for metals in commercially important shellfish.

PERIOD: January 1979 -

ORGANIZATION: James Cook University of North Queensland
Department of Biology
Post Office
Townsville, Qld 4811

PROJECT LEADER: Prof C. Burdon-Jones (077) 814530

EXPENDITURE: $40,000 (all years)

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

EXTERNAL SUPPORT: Department of Home Affairs and Environment (Covers cost of participation in an extension of a national programme into tropical waters.)

OBJECTIVE

To identify and evaluate marine organisms for possible use in a national monitoring programme for heavy metals in coastal and offshore areas in Australian waters, with special reference to the problems of monitoring in tropical locations.

METHODOLOGY

Over a five year period commencing 1979, and using Atomic Absorption Spectrometry and DPASU techniques, a wide range of organisms representing a range of trophic levels, have been analysed for Hg, Pb, Cu, Cd, Ni, and the effects of temperature and salinity on the uptake and depuration of these metals.

STATUS

The 1979 investigations reported on the distribution and metal levels of metals in a range of marine organisms.
The 1980 experiments evaluated selected organisms as potential sentinel organisms.
The 1981 programme explored the logistics and practicalities of initiating and maintaining a national monitoring programme for metals in bivalves. The 1983/84 experiments will be a continuation and extension of the programme into northern tropical waters.

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Heavy Metals/Indicator species/Trophic levels/Pollution monitoring/Shellfish fisheries/

[JAMESC054]

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233 Survey of polychlorinated biphenyls (PCBs) in Australian coastal waters.

PERIOD: January 1980 - December 1984

ORGANIZATION: La Trobe University
Microbiology Department,
Bundoora, Vic 3083

PROJECT LEADER: Prof J.S. Waid (03) 4792229

EXPENDITURE: $38,742 (this year), $168,883 (all years)

MANPOWER: 1.50 (this year), 7.50 (all years)

EXTERNAL SUPPORT: AMSTAC-FAP - $118,883

OBJECTIVE

To determine the extent of PCB contamination in sediments and biota of The Great Barrier Reef and Australian Coastal Waters.

METHODOLOGY

Samples of biota were collected from The Great Barrier Reef and at other sites around Australia. Material was prepared for analysis by clean up on florisil after extraction using soxhlet or blender.
Analysis of PCBs was carried out on a HP5880 GC equipped with 25M capillary column.

STATUS

Analysis of samples (sharks, clams, coral, fish) is now completed. All samples contained detectible concentrations of PCB. Levels were higher in sharks and carnivores than coral and small fish. Generally concentrations in biota were an order of magnitude lower than concentrations in biota from the northern hemisphere.
Several papers arising from this work are 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.

LOCALITY: Port Phillip Bay

GEOGRAPHIC REGIONS: R,B

MAJOR DESCRIPTORS: PCB/Pollution monitoring/Sediment sampling/Bioaccumulation/Pollution legislation/

[LATROB006]

234 Aromatic hydrocarbons in the marine environment.

ORGANIZATION: University of Melbourne
Marine Chemistry Laboratory,
Department of Inorganic Chemistry,
Department of Industrial Chemistry,
Parkville, Vic. 3052

PROJECT LEADERS: Dr J.D. Smith (03) 3451844
Dr J. Bagg

CONTACT OFFICER: Dr J.D. Smith

MANPOWER: 1.00 (this year)

EXTERNAL SUPPORT: AMSTAC

OBJECTIVE

To determine the distribution of aromatic hydrocarbons in the marine environment. To understand the source of these compounds, their pathways and fate. Study of the polycyclic aromatic hydrocarbons as priority pollutants, and other aromatic hydrocarbons as indicators of oil pollution. To develop improved methods for measuring aromatic hydrocarbons in marine samples.

METHODOLOGY

Solvent extraction, HPLC and fluorescence spectroscopy applied to tissues, sediments and waters.

STATUS

Results reported for Great Barrier Reef and Port Phillip Bay region. Improved methods being developed.

GEOGRAPHIC REGIONS: A,B,R

MAJOR DESCRIPTORS: Hydrocarbons/Oil pollution/Pollution monitoring/

[UNIMEL062]

See also: 15, 26, 31, 55, 115, 119, 120*, 149, 150, 169

235 Application of recreational opportunity spectrum concepts to Marine Park Planning.

PERIOD: April 1984 - October 1984

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

Environment Science and Services
P.O. Box 107,
Springhill, Qld 4000

PROJECT LEADERS: Dr W. Craik (077) 818811
Dr D. Pitts (07) 3711357

CONTACT OFFICER: Mr I.M. Dutton (077) 818811

EXPENDITURE: $2,590 (this year), $2,590 (all years)

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

OBJECTIVE

To evaluate the utility of the recreational opportunity spectrum (ROS) in the general context of marine park planning. To identify any specific areas of application where ROS techniques can be adopted to improve planning precedures and practices within the Great Barrier Reef Marine Park Authority.

METHODOLOGY

The study will be undertaken by literature review, assessment of relevant examples (including Great Barrier Reef Marine Park Sections), technique evaluation/appraisal and report production.

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: Marine parks/Recreational opportunities/Tourists/

[GBRMPA100]

236 Application of Recreational Opportunity Spectrum to a Marine Park.

PERIOD: January 1984 - December 1984

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

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

PROJECT LEADERS: Dr W. Craik (077) 818811
Ms K. Means (07) 2757111

CONTACT OFFICER: Ms E. Eager (077) 818811

EXPENDITURE: $800 (this year), $800 (all years)

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

OBJECTIVE

To establish whether a marine park composed of heterogeneous units can be treated as one recreational resource amenable to Recreational Opportunity Spectrum classification.

METHODOLOGY

Personal interviews of campers on islands in the Capricornia Section are being undertaken to determine visitors' behaviour, demands and perceptions.

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.

LOCALITY: Great Barrier Reef Marine Park - Capricornia Section

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Marine parks/Recreational opportunities/Tourists/

[GBRMPA112]

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237 Methods for the Re-establishment of Hard Corals in Denuded Reef Systems.

PERIOD: August 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,
Post Office,
Townsville, Qld 4811

PROJECT LEADERS: Dr W. Craik (077) 818811
Dr V. Harriott (077) 814111

CONTACT OFFICER: Ms E. Eager (077) 818811

EXPENDITURE: $10,091 (all years)

MANPOWER: 0.50 (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).

STATUS

Phase 1 has been completed.

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Coral reefs/Reef formation/

[GBRMPA101]

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238 **User Survey, Capricornia Section: Stage 1.**

PERIOD: May 1984 - November 1984

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

Environmental Science and Services
P.O. Box 107,
Springhill, Qld 4000

PROJECT LEADERS: Dr W. Craik (077) 818811
Dr D. Pitts (07) 3711357

CONTACT OFFICER: Ms S. Driml (077) 818811

EXPENDITURE: $1,500 (this year), $15,000 (all years)

MANPOWER: 0.20 (this year), 0.25 (all years)

OBJECTIVE

To design and conduct a survey of users of the Capricornia Section of the Great Barrier Reef Marine Park to ascertain perceptions and impacts of Marine Park planning and management.

METHODOLOGY

Design survey and select sample frame for all user groups, undertake pilot survey, review, and conduct survey using a combination of mail survey and personal interviews.

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.

LOCALITY: Great Barrier Reef Marine Park - Capricornia Section

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Resource management/Marine parks/User surveys/

[GBRMPA089]

See also: 220, 230

See: 42, 136, 215*

239 Shipping Risk Simulation Study.

PERIOD: March 1981 -

ORGANIZATIONS: James Cook University of North Queensland
Department of Civil & Systems Engineering
Post Office
Townsville, Qld 4811

Det Norske Veritas
8th Floor, 77 Pacific Highway
North Sydney, N.S.W. 2060

PROJECT LEADERS: Dr M.K. James (077) 814224
Mr T.K. Jenssen (02) 9221966

CONTACT OFFICER: Mr N. Lamberton (077) 814166 (James Cook University)

EXTERNAL SUPPORT: GBRMPA - $7,000 (84/85)

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. During 1984/85 this approach will be developed to the stage where validation against shipping casualty statistics from high traffic density areas such as the North Sea will be possible.

STATUS

An extensive survey of the literature on risk analysis and marine navigation has enabled a review of methodologies so far developed for the assessment of risks associated with very low probability events. A computer based model has been developed which simulates the navigation of vessels between Lizard Island and Cape Sidmouth. The logical structure and data requirements of the model are being refined through discussions with ship's masters and pilots experienced in this region. Significant data on shipping casualties in Western European waters have been acquired. These data provide the basis for a fault-free analysis of potential accident situations, now under way.

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Risks/Ships/Accidents/Mathematical models/

[JAMESC003]

See: 223

240 Aquatic Science Research Electronic Bulletin.

PERIOD: May 1982 -

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

CSIRO (Subcontract)
Division of Computing Research
Davies Laboratory
PMB, PO
Aitkenvale, QLd 4814

PROJECT LEADERS: Dr A.J. Gilmour (077) 818811
Dr D. Abel (077) 794855

CONTACT OFFICER: Dr A.J. Gilmour

EXPENDITURE: $2,500 (this year), $8,000 (all years)

MANPOWER: 0.10 (this year), 0.20 (all years)

OBJECTIVE

To produce an on-line, interactive bulletin of research-related information. This is a pilot study.

METHODOLOGY

The development of specifications for the bulletin was undertaken and software to produce the bulletin is being prepared. Potential users are being surveyed to evaluate potential use before implementation.

STATUS

The system is being reviewed in the light of electronic mail developments.

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Research programmes/Information retrieval/

[GBRMPA044]

Coral reefs

Great Barrier Reef Marine Park Authority