

Great Barrier Reef Marine Park Authority ANNUAL REPORT 1985-86

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Great Barrier Reef Marine Park Authority **ANNUAL REPORT** 1985-86

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Great Barrier Reef Marine Park Authority P.O. Box 1379 TOWNSVILLE QLD 4810

Dear Minister,

In accordance with section 60 of the **Great Barrier Reef Marine Park Act** 1975, I submit the Tenth Annual Report of the Great Barrier Reef Marine Park Authority on the operations of the Authority for the year that ended 30 June 1986.

Yours sincerely,

I parme Holliber

Graeme Kelleher Chairman

The Hon. Barry Cohen, MP Minister for the Arts, Heritage and Environment Parliament House CANBERRA ACT 2600

THE PHOTOGRAPHS

The colour photographs are from the brochure series, Reef Notes.

Reef Notes are making information on significant features and activities in the Marine Park available to a wide audience. The series is a joint project of the Authority and the Queensland National Parks and Wildlife Service to promote a better understanding of the Great Barrier Reef and the Marine Park. Its popularity is due in large part to the many excellent photographs which complement the short articles. Several of these photographs have been selected to illustrate this Annual Report and the title of the relevant Reef Note is highlighted in each caption.

Cover photograph

As the sun sets, trawlers make their way to the fishing grounds. Prawn trawling is by far the most important of the **Reef Region Fisheries.**

PHOTO CREDITS

Cover Don Moore

Page vi G. Morris

Pages 10 and 43 L. Zell

Page 16 Nev Collins

Page 23 Courtesy of the Townsville Bulletin

Page 26 P. Howorth

Page 36 Peter Harrison

Page 46 Bill Legg

Page 54 Brian King

Page 60 G. Bull

Produced by the Great Barrier Reef Marine Park Authority

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FROM THE CHAIRMAN

People may question the liberal use of graphic design and coloured illustrations in this report and other Authority publications, in a time of great financial stringency. The Authority is well aware of the need for restrictions in Government expenditure and, of course, supports the Government's policies. Why then are our publications beautifully illustrated?

The Great Barrier Reef is subject to pressures which are increasing rapidly. The system of management of this vast resource, embodied in the Marine Park, depends absolutely on public support for its effectiveness. Only a small minority of Australians have the opportunity to visit and see the beauties of the Great Barrier Reef. They cannot be adequately described in words alone. We believe that it is essential that we use every opportunity to communicate, through pictures, the natural qualities of the Great Barrier Reef, on which all of its intrinsic and great commercial values depend.

A major element in the Authority's program to educate the public about the Reef and thereby to obtain their commitment to its management, is the Great Barrier Reef Aquarium, which is being built in Townsville as part of the Great Barrier Reef Wonderland complex. The Government has approved the Authority operating this aquarium on a cost recovery basis, as its main educational facility. During the year the main tanks, one of which is to contain a living reef with waves and tides, were structurally completed. They will be sealed with epoxy paint and will then be filled with sea water, for establishment of the coral reef. The complex should be opened officially in June 1987.

In early 1986 a major multi-year program of research was commenced under the aegis of the Authority. This program, which is the result of the recommendations of the expert multi-disciplinary Crown of Thorns Starfish Advisory Committee (COTSAC), is directed at obtaining a fundamental understanding of the starfish and its place in the Reef ecosystem. From the management viewpoint, the most important unanswered question is: does

Opposite: **The Great Barrier Reef** is an immense and beautiful area of more than 2,600 coral reefs of many different forms. Lying towards the southern end of the Reef, the Pompey Complex, a tiny portion of which is pictured, contains many of the Marine Park's larger reefs and is characterised by complex lagoons and intricate channel systems, often with strong tidal currents.

From the Chairman 1

human activity contribute to the infestations of starfish? The Authority continues to believe that it is essential that this question be answered as soon as practicable, so that a soundly based decision can be made as to whether major programs to control the starfish should be implemented. The extent of recent damage to some parts of the Great Barrier Reef is such that there are no grounds for complacency. The Authority intends to continue to research this important question.

During the year proposals for floating structures on the Reef were further developed. In considering the merit of these proposals, we are conscious that the Great Barrier Reef covers an area larger than the States of Victoria and Tasmania combined, that the main body of the Reef is far from shore and that there are comparatively few islands in the Region. Islands are therefore a scarce and very valuable resource. We believe that ways should be found to allow the Australian public to visit and appreciate the Great Barrier Reef without threatening the natural qualities of these islands. Floating structures are one way of doing this.

The International Union for the Conservation of Nature and Natural Resources (IUCN) has identified the management system which has been established under the Great Barrier Reef Marine Park Act as a model for management of marine areas throughout the world. Increasingly, advice and assistance are sought from the Authority by agencies in other countries. The Authority's policy is that it will not divert its scarce human resources to such assistance unless this can be done without significantly affecting our primary responsibility - care and management of the Great Barrier Reef Marine Park.

While there have been many difficulties and traumas encountered in this past year, we have maintained our program of zoning and establishment of management in sections of the Marine Park, and expect that this process will be completed by our Bicentenary in 1988, when the zoning cycle will be recommenced. This achievement would not have been possible without the support of the Commonwealth and Queensland Governments and co-operation and assistance from Commonwealth and Queensland agencies, particularly the Commonwealth Department of Arts, Heritage and Environment, the Queensland National Parks and Wildlife Service and the Premier's Department. Members of the Authority are grateful for the continued dedication and competence of the Authority's staff.

2 From the Chairman

GREAT BARRIER REEF MARINE PARK AUTHORITY

ESTABLISHED BY THE GREAT BARRIER REEF MARINE PARK ACT 1975

The Great Barrier Reef Marine Park Authority, which was established under the Great Barrier Reef Marine Park Act, is a Commonwealth statutory body consisting of a full-time Chairman and two part-time members, one of whom is nominated by the Queensland Government.

The functions of the Authority, defined in section 7 of the Act as amended in November 1983 and June 1985, are as follows:

- '(a) to make recommendations to the Minister in relation to the care and development of the Marine Park including recommendations, from time to time, as to
 - (i) the areas that should be declared to be parts of the Marine Park; and
 - (ii) the regulations that should be made under this Act;
- (b) to carry out, by itself or in co-operation with other institutions and persons, and to arrange for any other institutions or persons to carry out, research and investigations relevant to the Marine Park;
- (c) to prepare zoning plans for the Marine Park in accordance with Part V;
- (ca) to furnish information and advice to the Minister in respect of matters relating to the Marine Park, including
 - (i) information and advice in relation to any agreement (including any proposed agreement) between the Commonwealth and Queensland on such matters;
 - (ii) information and advice on the following matters:
 - (A) whether the Commonwealth should grant financial assistance to Queensland in respect of a matter relating to the Marine Park;
 - (B) the amount and allocation of such assistance;
 - (C) the terms and conditions (if any) on which such assistance should be granted; and
 - (iii) information and advice on the following matters:
 - (A) whether it is desirable that Queensland should make payment to the Authority in respect of a matter relating to the Marine Park;
 - (B) the amount and allocation of such payment;
 - (C) the terms and conditions (if any) on which such payment should be given;

Great Barrier Reef Marine Park Authority 3

- (cb) to receive and disburse moneys appropriated by the Parliament for payment to the Authority for the purpose of payment of the moneys to Queensland by way of financial assistance to Queensland in respect of matters that relate to the Marine Park;
- (cc) to receive and disburse moneys paid to the Authority by Queensland under an agreement between —
 - (i) the Commonwealth and Queensland;
 - (ii) Queensland and the Authority; or
 - (iii) the Commonwealth, Queensland and the Authority;
- (cd) to provide, and arrange for the provision of, educational, advisory and informational services relating to the Marine Park;
- (d) such functions relating to the Marine Park as are provided for by the regulations; and
- (e) to do anything incidental or conducive to the performance of any of the foregoing functions.'

The 1985 amendments to the Act also confirm that the Authority is responsible for the management of the Marine Park.

The first appointments to the Authority were made in July 1976 and the first meeting of the three person Authority was held in August that year. Following the agreement of 14 June 1979 between the then Prime Minister and the Premier of Queensland on constitutional and jurisdictional issues, **the Great Barrier Reef Ministerial Council** was formed to co-ordinate policy of the two Governments. This arrangement has enhanced the Authority's pursuit of its responsibilities and functions in co-operation with the Government of Queensland, local authorities and the public.



4 Great Barrier Reef Marine Park Authority

OFFICE OF THE AUTHORITY

The Authority has established an office in Townsville and a small office in Canberra. This arrangement arises from the need for the Authority to have its principal technical resources close to the Reef and also to carry out essential functions in Canberra.

The Canberra office serves the Minister, consults with Commonwealth departments whose responsibilities are affected by or affect the Authority's programs, and provides the secretariat for the Great Barrier Reef Ministerial Council and the joint Commonwealth/Queensland Committee on Offshore Developments in the Great Barrier Reef Region.

The Townsville office carries out most of the Authority's operational activities.

The Chairman has the powers of, or exercisable by, a Secretary of a Department under the Public Service Act.

MEMBERSHIP

The full-time Chairman (and chief executive) of the Authority is **Mr Graeme Kelleher**, who was reappointed for his second five-year term on 20 December 1984. Mr Kelleher has extensive experience in a wide array of activities concerned with the environment. He was one of the three commissioners on the Ranger Uranium Environmental Inquiry, which was instrumental in shaping Australian Government policies concerning uranium, nonproliferation of nuclear weapons and land use in the Alligator Rivers Region of the Northern Territory. Mr Kelleher has also served as an



Mr Graeme Kelleher, Dr Joe Baker and Sir Syd Schubert. Great Barrier Reef Marine Park Authority 5

examiner of New Zealand's environment policies for the international Organisation for Economic Co-operation and Development (OECD).

Sir Sydney Schubert, Co-ordinator-General of Queensland and Secretary of the Queensland Premier's Department, is one of the two part-time members. As Co-ordinator-General, Sir Sydney has for many years had primary responsibility for advising the Queensland Government on natural resources development and management, and for implementing the Queensland Government's policies in such areas. As part of that responsibility he discharges significant functions in relation to the administration of the Queensland Marine Parks Act 1982. Sir Sydney's current five-year term expires on 30 June 1986.

Dr Joe Baker, OBE, is the other part-time member. Dr Baker was Director of the Sir George Fisher Centre for Tropical Marine Studies at James Cook University of North Queensland. In November 1985 he became Director of the Australian Institute of Marine Science (AIMS), Townsville. He has had extensive experience in marine scientific research and administration and is a member of many of Australia's scientific advisory bodies. His current five-year term expires on 30 June 1987.

| MEETINGS | | | |
|--|--|--|--|
| During 1985-86, the Authority held the following meetings: | | | |
| 1985 Date | LOCATION | 1986 Date | LOCATION |
| 8 August 11 September 10 December | Townsville Airlie Beach Townsville | 14 February 7 March 2 April 24 June | Townsville Brisbane Brisbane Brisbane |

During the course of these meetings, the Zoning Plan for the Central Section of the Marine Park was drafted and reviewed. It is expected to be considered during the August 1986 meeting of the Authority. The September meeting at Airlie Beach on the Whitsunday coast discussed interim management for the Central Section.

GOAL AND AIMS

The Authority has adopted a statement of its goal and aims which has been derived from, and is consistent with, the objects, functions and powers specified in the Act.

1. GOAL

To provide for the protection, wise use, understanding and enjoyment of the Great Barrier Reef in perpetuity through the development and care of the Great Barrier Reef Marine Park.

2. AIMS

These aims are subordinate to the primary goal and must be read in conjunction with it and with each other.

- 2.1 Social
 - To involve the community meaningfully in the establishment and management of the Marine Park.
 - To minimise regulation of, and interference in, human activities, consistent with meeting the goal and other aims of the Authority.
 - To achieve management of the Marine Park primarily through the community's understanding and acceptance of the provisions of zoning, regulations and management practices.
 - To achieve competence and fairness in the development and care of the Marine Park through the deliberate acquisition and use of relevant scientific and nonscientific information and techniques in decision-making and other activities.
- 2.2 Environmental
 - To provide for the protection of the natural features of the Reef, whilst providing for multiple use of the Reef's resources.
- 2.3 Economic
 - To minimise costs of developing and caring for the Marine Park consistent with meeting the goal and other aims of the Authority.
 - To provide for development compatible with the conservation of the Reef's natural resources.
 - To minimise inhibitions on economic activities consistent with meeting the goal and other aims of the Authority.
- 2.4 General
- To adapt the Marine Park and the operations of the Authority to changing circumstances.

Great Barrier Reef Marine Park Authority 7

THE MINISTER

During the year under review, the **Hon. Barry Cohen**, MP, the Minister for Arts, Heritage and Environment, exercised portfolio responsibilities for the Great Barrier Reef Marine Park Act.

The Minister convened two meetings of Ministerial Council in Cairns in October 1985 and in Gladstone in April 1986. Further details are provided on pages 9 and 10. On this latter visit to the Region, Mr Cohen also participated in the official opening of the Heron Island Information Centre.

The Act provides that the Authority 'shall perform its functions in accordance with any general directions given by the Minister not inconsistent with this Act'. No such directions were given to the Authority during the year.

EXECUTIVE OFFICER

Dr Don Kinsey is the Executive Officer of the Great Barrier Reef Marine Park Authority. He is responsible to the Chairman for the efficient operation of the Townsville office. He is also Secretary to the three-member Great Barrier Reef Marine Park Authority. Dr Kinsey has long held an interest in marine science and has had extensive research and administrative experience in industry and in marine institutes in the United States and Australia.

SECRETARIAT

Staff of this section provide secretariat support for the Authority and the Great Barrier Reef Consultative Committee. Mr Chris Smalley is Secretary to the Consultative Committee.

GREAT BARRIER REEF MINISTERIAL COUNCIL

The Great Barrier Reef Ministerial Council was established in June 1979 to co-ordinate policy on the Reef between the Commonwealth and Queensland Governments at Ministerial level. The Council comprises four Ministers, two from each Government. During the year two Ministerial Council meetings were held.

TENTH MEETING

The tenth meeting of the Council took place in Cairns on 29 October 1985. Ministers who attended the meeting were:

- the Hon. Barry Cohen, MP, Commonwealth Minister for Arts, Heritage and Environment Convenor
- the Hon. Sir Joh Bjelke-Petersen, KCMG, MLA, Premier of Queensland
- the Hon. Peter McKechnie, MLA, Queensland Minister for Tourism, National Parks, Sports and the Arts.

The Hon. John Brown, MP, Minister for Sport, Recreation and Tourism was unable to attend the meeting due to other commitments.

At the meeting, Council:

- examined the proposed zoning plan for the Central Section of the Great Barrier Reef Marine Park and noted the timetable for the public participation and review process
- noted that the Authority had been allocated \$971 000 for 1985-86 to undertake the first year of the crown of thorns research program recommended by the Crown of Thorns Starfish Advisory Committee in January 1985
- noted that as the zoning of successive sections of the Marine Park proceeded, there would probably be increases in the cost of managing the Park effectively.

ELEVENTH MEETING

The eleventh meeting of the Council took place in Gladstone on 3 April 1986.

Ministers who attended the meeting were:

- the Hon. Barry Cohen, MP Convenor
- the Hon. Peter McKechnie, MLA
- the Hon. William Gunn, MLA, Deputy Premier of Queensland, representing the Premier.

The Hon. John Brown, MP, was unable to attend.

At the meeting, Council:

- re-examined the proposed zoning plan for the Central Section of the Great Barrier Reef Marine Park and noted that 489 public representations had been received during the three month period of the public participation phase which ended on 29 November 1985
- noted that the Central Section Zoning Plan is likely to come into operation in early 1987
- noted the zoning program for the southern sections of the Great Barrier Reef Marine Park, and that the plan is expected to come into operation in mid 1988
- examined the Three-year Rolling Program for the management of the Marine Park for the period 1986-87 to 1988-89
- noted that a review of day-to-day management strategies was underway to determine whether more effective management practices could be developed
- noted progress on the development of a management agreement for day-to-day management of the Marine Park
- noted the recent endorsement by the Crown of Thorns Starfish Advisory Review Committee of a scientific research program developed by the Authority and the Australian Institute of Marine Science to investigate the crown of thorns starfish phenomenon in the Great Barrier Reef Region
- noted the latest situation with regard to several proposals presently before the Authority involving the construction and mooring of structures to accommodate overnight visitors on reefs located some distance from the mainland
- noted a report on the effects on the Great Barrier Reef of Cyclone Winifred which crossed the Queensland coast on 1 February 1986, and further noted that additional evaluation surveys were scheduled which will include an evaluation of the socio-economic impact of the cyclone on Reef-related activities.

Opposite: **The Soft Touch — Another View of Coral** is provided by this Xenia sp., one of the many soft corals which lack the rigid limestone skeletons of the hard reef-building corals. 10 Great Barrier Reef Ministerial Council



GREAT BARRIER REEF CONSULTATIVE COMMITTEE

ESTABLISHED BY THE GREAT BARRIER REEF MARINE PARK ACT 1975

The functions of the Committee, defined in section 21 of the Act are as follows:

- '(a) to furnish advice to the Minister, either of its own motion or upon request made to it by the Minister, in respect of matters relating to the operation of this Act; and
- (b) to furnish advice to the Authority in respect of matters relating to the Marine Park, including advice as to the areas that should be parts of the Marine Park, referred to it by the Authority.'

The Consultative Committee represents a wide and varied cross-section of interests in the Great Barrier Reef, from both the public and private sectors and including tourism, fishing, science and conservation. The Committee consists of members appointed by the Minister, and a member of the Authority appointed by the Authority.

The three-year term of the 14 members appointed by the Minister in 1982 concluded on 3 October 1985. On that date the Minister announced 14 new appointments.

Mr Kelleher, who is the Authority's appointee, has an indefinite term.

MEMBERSHIP TO 3 OCTOBER 1985

- Professor Kevin Stark (Chairman) James Cook University of North Queensland
- Dr Robert Bain Commonwealth Department of Primary Industry
- Mr Dale Bryan Queensland Commercial Fishermen's State Council
- Mr Paul Eccles Commonwealth Department of Transport
- Mr Ernest Grant Queensland Department of Harbours and Marine
- Mr Edward Hegerl Australian Littoral Society and Queensland Conservation Council
- Mr Tor Hundloe Australian Conservation Foundation

12 Great Barrier Reef Consultative Committee

- Mr John Izatt Queensland Game Fishing Association
- Mr Graeme Kelleher Great Barrier Reef Marine Park Authority
- Mr Patrick King Queensland Tourist and Travel Corporation
- Dr Patricia Mather Australian Coral Reef Society (incorporating the Great Barrier Reef Committee)
- Mr Gordon McKauge
 Far North Queensland Promotions Bureau Tourism Task Force
- Mr Keith Nielson Commonwealth Department of Sport, Recreation and Tourism
- Dr Peter Saenger Australian Underwater Federation and Queensland Amateur Fishing Council
- Dr Graham Saunders Queensland National Parks and Wildlife Service

NEW MEMBERS OF THE CONSULTATIVE COMMITTEE ARE:

- Mr Andre Maestracci Hayman Island Resort
- Dr Helene Marsh James Cook University of North Queensland
- Mr Jim Miller Queensland Department of Primary Industries
- Mr Leon Wruck Heron Island Pty Ltd

RETIRING MEMBERS WHO WERE REAPPOINTED ARE:

- Dr Robert Bain
- Mr Dale Bryan
- Mr Paul Eccles
- Mr Edward Hegerl
- Mr Tor Hundloe

- Mr Gordon McKauge
- Mr Keith Nielson
- Dr Peter Saenger
- Dr Graham Saunders
- Professor Kevin Stark

Professor Stark was re-elected Chairman by the new Consultative Committee.

Administrative and secretariat support for the Consultative Committee is provided by staff of the Authority.

MEETINGS

The Consultative Committee met three times in 1985-86, at South Mission Beach (near Tully), in Townsville and in Brisbane. In conjunction with the meeting at Mission Beach, members visited Beaver Cay in the Cairns Section of the Marine Park, which featured in a recent television documentary on the crown of thorns starfish.

During the year, the Consultative Committee responded to requests from the Authority for advice on:

- the proposed zoning plan for the Central Section
- zoning of the Capricorn Section
- review of the Capricornia Section Zoning Plan

and added to earlier advice on policy aspects of offshore developments in the Great Barrier Reef Region. The Authority has also sought the support of members of the Committee in explaining the Far Northern Section Zoning Plan, and its development, to the sectors that members represent.

During the year, the Minister provided the Authority with particulars of advice furnished to him by the Consultative Committee concerning:

- public relations and publicity needs of the Authority regarding controversial issues
- funding for the program of research into the crown of thorns starfish
- a recommendation that there be a review by the Authority, in consultation with the affected users, of the information on which the Far Northern Section Zoning Plan is based and of the effects of that Plan on the users of the Reef
- a suggestion that, in addition to the existing consultative procedures, formal arrangements for the resolution of disputed facts between the Authority and the commercial fishing industry would be generally advantageous.

14 Great Barrier Reef Consultative Committee

1985-86 HIGHLIGHTS IN REVIEW

12 July 1985 Commonwealth House of Representatives Standing Committee on Environment and Conservation visited North Queensland and the Authority on a fact-finding tour, focussing on the crown of thorns starfish issue.

19 July 1985 Amendments to the Great Barrier Reef Marine Park Regulations to control offshore structures in unzoned sections of the Marine Park came into force.

2 September 1985 Start of the period for receipt of public representations on the draft zoning plan for the Central Section.

3 October 1985 The Minister announced the new membership of the Consultative Committee on the conclusion of the three-year term of the 14 Ministerial appointments made in 1982.

29 November 1985 End of the period for receipt of public representations on the draft zoning plan for the Central Section.

11 January 1986 Seven Reef Appreciation Areas were declared in the Capricornia Section of the Marine Park.

1 February 1986 Far Northern Section Zoning Plan came into effect.

6 February 1986 Queensland Government declared a marine park over the State tidal lands and waters around the Capricorn-Bunker groups of islands.

17 February 1986 The Crown of Thorns Starfish Advisory Review Committee met for the first time and recommended a detailed program of co-ordinated research into the crown of thorns starfish phenomenon on the Great Barrier Reef.

3 April 1986 The Heron Island Information Centre was opened jointly by the Minister for Arts, Heritage and Environment, the Hon. Barry Cohen and the Deputy Premier of Queensland, the Hon. William Gunn.

7 April 1986 Start of the period for receipt of public representations on the preparation of a zoning plan for the southern sections (Capricorn and Capricornia).

30 June 1986 End of the period for receipt of public representations on the preparation of a zoning plan for the southern sections (Capricorn and Capricornia).

1985-86 Highlights in Review 15



PLANNING

The Planning Section is responsible to the Chairman for preparing recommendations on the declaration of sections of the Marine Park and for developing zoning plans and making recommendations for regulations that establish the basis for management of those sections.

Planning is based on the synthesis and analysis of information on the characteristics, resources and uses of the Great Barrier Reef Region. This information is obtained from technical literature, specialist reports prepared by consultants, staff and other public instrumentalities and from representations made by the public.

On behalf of the Authority, the Planning Section program objectives for 1985-86 were:

- completion of the Far Northern Section Zoning Plan
- preparation of the recommendations for the Central Section draft zoning plan to the Authority and conduct of the consequent public participation program
- planning the program for zoning the southern sections (Capricorn and Capricornia)
- continuation of the development of computerised planning support and other data bases including mapping and remote sensing activities.

These objectives, as detailed below, were achieved.

PUBLIC PARTICIPATION PROGRAM

The program is an important part of the development of the zoning plan for each section of the Marine Park. It ensures that the views and wishes of people with an interest in the Marine Park are considered in the planning process. Valuable information on the use of the Reef is also obtained through the program and complements scientific knowledge of the natural resources. Guidelines for the public participation program are set out in the Great Barrier Reef Marine Park Act. They require the Authority to invite public representations during two stages of the development of a zoning plan.

The first stage of public participation (**Notice of Intent to Prepare a Zoning Plan**) aids the preparation of the draft zoning plan. In this stage, the public is

Opposite: Reef lagoons provide calm waters which are ideal for turtle mating. The Great Barrier Reef is one of the most important sea turtle habitats in the world. Several islands, especially Raine Island in the north, are nesting places for thousands of **Turtles**.

asked to provide information on the uses and characteristics of the Park section in question and to make recommendations for zoning and management.

In the second stage (**Draft Zoning Plan**), comments are invited on the draft plan and respondents are asked to highlight details they support as well as those they oppose. This information helps to revise the draft plan, creating the final zoning plan that will be in effect for the next five years. The zoning plan provides for conservation of the resources of the section while allowing all reasonable uses.

To reach all members of the public who may have an interest in the development of the zoning plan, the Planning Section works closely with the Education and Information Section to advertise the program. Television and radio are used to alert local communities to the need for their participation in developing practical management plans for the Marine Park. Explanatory booklets and brochures are distributed by mail, through displays set up at regional centres and at user-group meetings. The mail-back brochure invites answers to questions and is the primary avenue of response by the public. Meetings with specific interest groups are arranged to explain the role of the Authority and the zoning plan and to gather additional useful information.

COMPLEMENTARY ZONING

The Authority co-operates with relevant Queensland Government agencies in the development of zoning strategies and plans. Officers of the Queensland Premier's Department and the Queensland National Parks and Wildlife Service (Q.NPWS) are members of planning teams actively preparing recommendations and programs for zoning the Central Section and southern sections.

Officers of the Authority were members of a Queensland Department Working Group developing a draft version of the Queensland marine park zoning plan for the tidal lands and tidal waters lying within and adjacent to the outer boundaries of the Central Section of the Great Barrier Reef Marine Park.

FAR NORTHERN SECTION

The preparation of the Zoning Plan for the Far Northern Section of the Marine Park concluded during the year. The Zoning Plan was tabled in both Houses of the Federal Parliament on 12 September 1985. In accordance with the Act it lay before Parliament for 15 sitting days. There was no motion of disallowance in either House. Following its passage through Parliament, the Zoning Plan came into effect on 1 February 1986.

A zoning plan seeks to provide for conservation of the Great Barrier Reef environment and for the reasonable use of the Reef. Inevitably in finalising such a plan there are contentious issues which the Great Barrier Reef Marine Park Authority is required to consider. As with most planning decisions no interested party is ever completely satisfied. For the Far Northern Section Zoning Plan commercial fishing and conservation interests expressed directly contrasting dissatisfaction over the provisions of the zoning of Shelburne Bay. The tabling period represents the last chance for interest groups to have the plan revised and more closely reflect their wishes.

CENTRAL SECTION

Preparation of the zoning plan for the Central Section has continued through the year and a draft version of the zoning plan was released for public review between September and November 1985. To ensure the public were aware of this opportunity to submit representations the Authority embarked on a multi-media advertising campaign. Announcements were broadcast on television and radio over the 3-month period. Displays placed to attract the attention of Park users also acted as distribution points for the explanatory booklet and mail-back brochure. Respondents to the first phase of the program also received a brochure through the mail. Further contributions to the review of the draft plan were elicited in meetings with individuals and organised groups.

The Authority received a total of 489 representations originating from a broad cross-section of the community. A range of views was expressed and the zoning of the Whitsunday Islands area was a particularly sensitive issue. Support for details of the draft plan and recommendations for change were closely considered. A revised plan was prepared to take into account the public representations and the comments of State and Commonwealth working groups. After revision, the plan was considered by Ministerial Council in April. Finalisation of the zoning plan is continuing. It is expected that the plan will be submitted to the Minister in late 1986.



Planning 19

SOUTHERN SECTIONS (CAPRICORN AND CAPRICORNIA)

The preparation of the zoning plan for the southern sections has added a new dimension to the Authority's zoning process. For the first time a zoning plan currently in effect will be subject to review.

The Capricornia Section Zoning Plan has been in effect since July 1981. The Authority's policy of reviewing zoning plans every 5 years means the review of this existing zoning plan will be undertaken simultaneously with the development of the plan for the Capricorn Section.

The Capricorn Section of the Marine Park was proclaimed in 1984 and it has not been zoned previously. This Section surrounds the Capricornia Section.

It is anticipated that at the end of the zoning process the two sections will be combined into one section under a single zoning plan, probably to be called the Southern Section. Although the Capricornia Section Zoning Plan is being reviewed it remains in effect until the new plan for the two sections comes into effect.

Following the compilation of an inventory of the sections' resources, the public was invited to provide information on the uses and characteristics of the sections and to make recommendations for zoning during the public participation program that ran from April to June 1986.



Displays, such as this one outside the Authority's Townsville office, attracted the attention of Marine Park users during the public review period for the draft zoning plan prepared for the Central Section.

To assist the public in making a representation and to enhance public awareness of the zoning process, a mail-back brochure entitled **Help Zone the Southern Sections (Capricorn and Capricornia)** and an information booklet were produced. A publicity campaign built upon successful methods used in previous public participation programs operated over the 3-month period. Early submissions indicate that this process will once again provide valuable information for the development of the zoning plan for the southern sections.

AUTOMATED DATA PROCESSING

Installation of the Digital Equipment Corporation (DEC) VAX11/750 Supermini-computer was completed in July 1985. The computer supports 36 visual display terminals plus an assortment of printers and other peripheral devices. Major software components are the UNIX operating system, ORACLE database management system, WordMARC word processing and DI-3000, a suite of graphical programs. The system provides for the word processing, administrative, planning and database requirements of the Authority.

Since installation of the computer, several databases have been developed, notably components of the REEFLEX database, financial management, and permits. The REEFLEX database encompasses the Authority's collection of inter-related data sets pertaining to the Great Barrier Reef.

Telecommunications in the form of two dial-up modem lines and a CSIRONET 'Gateway' computer have been added to the system. Access to the Authority's computer can now be achieved routinely by the Canberra office, Q.NPWS and certain other organisations with which agreements have been concluded.



It has been found in practice that the ORACLE database system, the purpose for which the computer was acquired, permits very rapid development of user applications. The ORACLE system places a heavy burden on computer resources however, and can cause difficulties in maintaining response speed for other uses. In order to maintain the use of the computer for database purposes, a small separate system is planned which will be devoted to word processing with the capability for electronic mail exchange document, and printer sharing with the larger system.

A software research project, CORGIS (COllaborative Reef Geographic Information System), was recently implemented on the Authority's computer. The project was conducted by the CSIRO Division of Information Technology and partially funded by the Authority. Once maps of the Marine Park are available in a suitably digitised form, this product, combined with the REEFLEX database, will become a major management tool.

MAPPING

Preparation of the Great Barrier Reef Series of maps continued during the year. This series covers the Great Barrier Reef Region with 26 individual mapsheets at a scale of 1:250 000. The maps depict the zoning plans applied to the sections of the Marine Park, each type of zone denoted by a different colour, overlaid on the natural features of the Region. The first seven of these maps cover the Far Northern Section of the Marine Park and were published in August 1985 as part of the Far Northern Section Zoning Plan. Another eight maps in the series are being produced for the Central Section.

As well as the new map series, smaller maps of the Central Section and southern sections have been prepared as part of the information brochures for public participation programs run by the Authority during the year.

REMOTE SENSING

Staff of the Authority have been directly involved in a number of activities involving application of remote sensing to the marine environment. A workshop organised by the Authority for UNESCO was held at the Australian Institute of Marine Science (AIMS), Townsville, during August 1985. The overall aim of the workshop was to introduce resource planners, researchers and managers to digital image processing of remotely sensed data and its applications in coral reef, oceanographic and estuarine studies. Marine resource specialists from South East Asia, the South West Pacific and Australasia attended. Authority staff edited the workshop proceedings, which are to be published by UNESCO in the near future.

As previously reported, in collaboration with the Authority, the CSIRO Division of Water and Land Resources developed the BRIAN (Barrier Reef Image ANalysis) system for processing satellite images. As the name suggests, this system was developed specifically to manipulate data collected by remote sensing satellites for the analysis of the Great Barrier Reef.

The system has now been adapted by the CSIRO and a commercial firm, Microprocessor Applications Pty Ltd, of Melbourne, for use on microcomputers. The commercial development and launch of the aptly named micro-BRIAN has met with a good response from potential users.



Two CSIRO publications describing the BRIAN system were received during the year:

Jupp D. et al (1985) **The BRIAN Handbook. An Introduction to Landsat and the BRIAN System for Users.** CSIRO Natural Resources Series No.3.

Jupp D. et al (1985) Interpretation of Landsat Data by Computer Classification and Labelling. CSIRO Natural Resources Series No. 4.

The Authority also published a research report by Dr Jupp, entitled **The Application and Potential of Remote Sensing for the Great Barrier Reef** as a companion volume to these reports.

Authority staff took an active part in the establishment of a north Queensland-based remote sensing user's group in Townsville in January 1986. The group, known as Tropical Environment Remote Sensing (TERS) Working Group, has expanded from its initial small discussion group to include members from the Authority, CSIRO, AIMS, Q.NPWS, James Cook University of North Queensland (JCUNQ) and local surveyors. The aim of the group is to play an active role in monitoring and providing advice on applications and developments in remote sensing of tropical environments to their parent organisations.

A paper entitled Managing Coral Reefs: Operational Benefits of Remote Sensing in Great Barrier Reef Marine Park Planning was prepared by staff of the Planning Section and presented by D van R Claasen, Senior Project Manager of the Section, at the 10th Canadian Symposium on Remote Sensing in Edmonton, Canada in May 1986.

A visit was also made to the Data Information Services Branch of the National Oceanic and Atmospheric Administration (NOAA) in Washington, DC, USA, to select relevant Coastal Zone Colour Scanner imagery to be used in the crown of thorns research project 'Relationships between *Acanthaster* outbreaks and water mass characteristics in the Great Barrier Reef Region'.

Overleaf: The adaptation of the Barrier Reef Image ANalysis (BRIAN) system for use on microcomputers has given Authority staff more direct access to the use of remote sensing as a powerful management and environmental monitoring tool. Senior project officer with the Planning Section, Dan Claasen, studies a coastal zone colour scanner image of the Reef between Lizard and Dunk Islands on the micro-BRIAN.

LEGISLATION

Early in the year a number of amendments to the **Great Barrier Reef Marine Park Act** 1975 came into effect. These amendments included:

- changes to the functions of the Authority to make it clear that the Authority is responsible for the management of the Marine Park and the provision of educational, advisory and information services relating to the Marine Park; and
- increases to the penalties for certain offences. In particular, penalties for offences against section 38 of the Act, which prohibits operations for the recovery of minerals, were increased to \$50 000.

A significant change to the Regulations under the Act was the introduction of controls over offshore developments in the unzoned sections of the Marine Park. These new regulations deal with a number of activities (including structures, long term operation of vessels in the one vicinity, mariculture, and engineering works) which have the potential for significant environmental damage and which might, by their establishment, pre-empt zoning options.

A detailed review of the Act and Regulations was undertaken during the year and certain changes to legislation will be proposed. The Planning Section was involved in continued development of more comprehensive legislation to control sea installations, including tourist structures.

POLICY

This year has been the first in which the Planning Section has included an officer whose duties have been largely the development of policy on the use and administration of the Marine Park. Policy issues previously unaddressed are now receiving attention and project teams have been drawn together to assist in developing policy on the more pressing issues. Matters on which there has been substantial policy development during the year include offshore structures, mariculture, collecting, management planning and the permit system.



PARK MANAGEMENT

The function of the Park Management Section is to further the goal and aims of the Authority by implementing the provisions of zoning plans and regulations. This is done in conjunction with Queensland National Parks and Wildlife Service (Q.NPWS) who are the primary day-to-day managers of the Marine Park. This involves, mainly, management of the people using the Park. In line with the aims of the Authority every effort is made to involve the community in this process. Management of the Marine Park seeks to minimise interference in human activities consistent with conservation and to encourage community understanding and acceptance of operations and the provisions of zoning plans and regulations.

The legal and strategic framework for management is provided by the Act, zoning plans and regulations. These not only lay down the basic policy objectives for managing each section but also identify which activities are prohibited in particular areas, which activities are to be controlled by permit and what penalties may be incurred for non-compliance. Although zones identified in a zoning plan are fixed for the life of the plan (5 years), there are a number of limited access or limited activity areas (e.g. Reef Appreciation Areas and Replenishment Areas) which can also be brought into effect at the discretion of the Authority.

The public participation programs that are conducted during the preparation of a zoning plan lay the groundwork for public support in the implementation of the plan.

The broad objectives of the Park Management Section for 1985-86 were, in co-operation with Q.NPWS, to:

- consolidate management for the Cairns and Cormorant Pass Sections
- implement management for the Far Northern Section from February 1986
- prepare for management of the Central Section
- conduct interim management over the Central and Capricorn Sections
- assess and issue permits for offshore developments as required under new regulations for unzoned sections of the Marine Park

Opposite: Redbill Reef near Mackay is an unusual reef due to its high exposure at low tide and terraced reef edge. Bushy Island, the cay on this reef, is one of the well-vegetated **Coral Cays** of the Great Barrier Reef. It is a Queensland National Park.

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• prepare for review of the Capricornia Section.

These objectives were attained in broad terms, although budgetary constraints required a substantial reduction in preparation for management of the Central Section.

QUEENSLAND CO-OPERATION

Although the Authority remains ultimately responsible to the Minister for all those aspects of the Marine Park specified in section Z of the Act (see page 3), agreement was reached in 1979 between the Commonwealth and Queensland governments on a complementary approach to the management of the Park. The Authority is responsible for the development of management planning, policy, programs and objectives, and general oversight of Marine Park management. Q.NPWS is the principal agency responsible to the Authority for day-to-day management of the Marine Park. Other agencies with ancillary responsibilities for day-to-day management are the Queensland Boating and Fisheries Patrol, Queensland Water Police, the Australian Federal Police and the Federal Sea Safety and Surveillance Centre.

Co-operation between the Authority and Q.NPWS is achieved formally through the activities of the Great Barrier Reef Management Co-ordinating Committee, and less formally, through liaison between officers of the Authority and officers of Q.NPWS. Major co-operative activities during the year have included the development of management policy and programs, conduct of coral trout surveys, development of a management plan for Michaelmas Cay and Reef and assessment of permits.

REGION-WIDE OPERATIONS

Surveillance matters were important in 1985-86. Authority staff assisted in evaluating the surveillance capability of the Federal Sea Safety and Surveillance Centre's (Coastwatch) program for the Great Barrier Reef. Sideways-Looking Airborne Radar (SLAR) and a fully equipped Beechcraft 200B were tested with mixed results. The SLAR added little to enhance the basic visual surveillance by trained observers and ceased at the end of September 1985. However, equipment malfunctions with the Beechcraft prevented full evaluation of its potential, particularly for night surveillance. As the major user of the Coastwatch Great Barrier Reef program, the Authority has contributed to future surveillance planning.

Surveillance observations, particularly of vessel and human activities and natural events, have been entered onto a database in the Authority's computer system. These data will contribute to future planning and management.

Major reviews of expenditure on day-to-day management were undertaken with Queensland Government agencies for the 1985-86 Budget. Further growth in day-to-day management expenditure is provided for, within tight budgetary constraints, in forward plans to establish management for the Far Northern, Central and Southern Sections of the Marine Park.

A complete review of day-to-day management was started in January 1986. The purpose of the review is to provide for the most efficient use of resources available for day-to-day management. The review is expected to

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Figure 4

ESTIMATED EXPENDITURE ON DAY-TO-DAY MANAGEMENT OF THE GREAT BARRIER REEF MARINE PARK 1985-86 AND 1986-87 *



* Figures as at 31 July 1986, subject to Commonwealth and Queensland budgets.

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* Figures as at 31 July 1986, subject to Commonwealth and Queensland budgets.

³⁰ Park Management

finish in 1986 and will focus on objectives, achievements and deployment of staff and other resources.

The preparation of a sign manual for use by Q.NPWS staff in day-to-day management and incorporating the joint Marine Parks logo was commenced in May 1986 for completion by September 1986.

FAR NORTHERN SECTION

The Zoning Plan and Regulations for the Section came into operation on 1 February 1986. Prior to this, Q.NPWS made extensive contact with users. A major management exercise involving boat patrols together with aerial surveillance was carried out in March-April 1986. Assistance was provided by a Navy patrol boat and Coastwatch aircraft in this exercise. Special attention was paid to contacting commercial fishermen operating in the Section. Monitoring of fishing activities, provision of advice to fishermen, and surveys of reefs and islands were undertaken successfully.

The operations of the Far Northern Section of the Marine Park are combined with those for the Cairns Section and are co-ordinated from the Far Northern Region Office of Q.NPWS in Cairns.

Limited numbers of staff are available for this vast area and there is therefore heavy reliance on aerial surveillance and user compliance.

Plans have been made for negotiations with the residents of Lockhart River Mission, Wujal Wujal Mission, Bamaga and Thursday Island on the issue of permits particularly for the hunting of dugong and turtle.

The building of a management base on Flinders Island was commenced in 1985-86. A management presence for both marine park and island national park management is urgently needed in this area.

CAIRNS AND CORMORANT PASS SECTIONS

1985-86 was the second year of operations for the Sections and a year of substantial achievement. For example, routine operational systems, including surveillance and public contact programs, were established, staff responsibilities identified, information management systems commenced and capital equipment acquired and put into service.

The old Cairns Bond Store was refurbished and occupied by Q.NPWS ranger staff during the year. A contract to build a 10-12 metre vessel for transport and patrol work was commissioned in May 1986 and is expected to be completed by November 1986.

Major management emphasis continues to be directed towards the Green Island Reef-Hastings Reef-Michaelmas Reef area. The use of seaplanes and their effects on seabirds and humans has been of concern in this area. Because of conflicting claims by different user groups, total seaplane flights to Michaelmas Reef and Cay have been held to 10 per month, pending the outcome of studies to determine management strategies for this use. Staff of the Authority and Q.NPWS are jointly preparing a management plan for Michaelmas Cay and Reef.

The Cairns Section is experiencing substantial growth in tourism. This will place heavy pressure on the day-to-day management resources in the coming year.

CENTRAL SECTION

Interim management for the Central Section was carried out in 1985-86 mainly in relation to regulations on waste discharge, spearfishing and offshore structures. In addition preparations were made for the commencement of management to implement the zoning plan which is now expected to come into effect in mid 1987.

A joint task force of staff from the Authority and Q.NPWS has been established to co-ordinate planning. Members of the task force also participated in the preparation of the zoning plan for the Section.

This Section, with its major tourism industry centered around the Whitsunday Islands and a substantial trawling industry, will also place heavy demands on management resources.

CAPRICORNIA SECTION

Day-to-day management of this Section is now well established. The appointment of a senior management officer and the experience of staff



Marine Park users now have convenient access to information in Cairns. The old Bond Store near the waterfront has been refurbished to provide this attractive office managed by Q.NPWS Marine Park officers.

developed over the past four years have contributed to efficient organisation of field operations and management planning.

An information centre on Heron Island was opened jointly by the Commonwealth Minister for Arts, Heritage and the Environment, the Hon. Barry Cohen, MP, and the Deputy Premier of Queensland, the Hon. William Gunn, MLA, in April. The centre, built on a sublease of the Heron Island Resort, provides the major focus for interpretive activities for all visitors to the island.

Reef Appreciation Areas were declared at seven reefs in the Section (Lady Elliott, Lady Musgrave, Heron, Wistari, Masthead, North-West and Tryon). The objective of Reef Appreciation Areas is to provide areas on heavily used reefs for public appreciation and enjoyment, free from fishing and collecting (other than for research purposes). These areas will be marked by pencil buoys designed by Q.NPWS staff.

Difficulties have been experienced with the performance of Protector II, the Section's patrol boat. A replacement boat with greater cruising range has been approved for 1986-87.

The Replenishment Area at North Reef was reopened on 1 July 1986. The closure of the Replenishment Area at Boult Reef has been extended to 1 December 1986 to allow for the preparation of an intensive study of the effects of fishing on the area when it is reopened.

A management liaison group on Lady Elliott Island has been established to co-ordinate day-to-day management matters concerning the island. Membership comprises representatives of the Authority, Q.NPWS, Lady Elliott Island Resort and the Commonwealth Department of Transport. Planning has commenced for the establishment of a reef education centre on the island.

On 6 February 1986, the Queensland Government declared a marine park over the State tidal lands and waters around the islands of the Capricorn-Bunker groups. The zoning plan for the (State) Capricorn-Bunker Marine Park was prepared in co-operation with the Authority and closely resembles the adjacent zoning plan under the Great Barrier Reef Marine Park Act. Management of the State marine park is incorporated in existing day-to-day management arrangements for the Great Barrier Reef Marine Park.

Despite logistic difficulties in obtaining evidence in the field, three successful prosecutions for illegal fishing, the first under the Great Barrier Reef Marine Park Act, were concluded in 1985-86. Substantial fines (up to \$1000) have been imposed. Several other prosecutions are pending. The Authority and its agents emphasise education in management but also maintain that serious or repeated infringements should be prosecuted.

CAPRICORN SECTION

Interim management of the Capricorn Section, consisting mainly of surveillance flights, was carried out in 1985-86 by Capricornia Section staff. These staff are also involved in the preparation of the zoning plan for this Section, which is expected to come into operation in 1988.

PERMITS

The purposes of the permit system are to:

- separate potentially conflicting uses
- encourage responsible behaviour in reef users
- limit certain activities when this is found necessary
- collect data on reef use.

During the year 521 permits were issued, 171 more than 1984-85. (Figure 6). The permit system within the Authority has been computerised to facilitate processing and retrieval of data. Periodic reviews aim to eliminate unnecessary permit requirements and simplify procedures, consistent with effective management.

Apart from offshore tourist structures the main categories of permits requiring the development of policy and procedures in the past year have been clam mariculture and waste discharge.



OFFSHORE STRUCTURES

In July 1985 new regulations to control the operation of offshore structures in unzoned sections of the Marine Park came into effect. This immediately generated a requirement to obtain permits for prescribed activities which occur in unzoned sections of the Marine Park e.g. floating hotels, floating pontoon systems, mariculture projects.

The most complex of the projects to be considered by the Authority to date has been a floating hotel to be moored at John Brewer Reef off Townsville. This project has required the development of new types of policy guidelines and permit conditions. Potential environmental impacts from the operation of the floating hotel have been considered carefully in permit conditions and in the design of the structure. The proponents, Barrier Reef Holdings Ltd have been very co-operative in meeting the stringent requirements of the Authority for this innovative venture. This project has involved Authority staff in new policy areas such as public equity, insurance and third party liability indemnities against both accidental and unforeseen environmental impacts.

The project is expected to be completed by July 1987. Before coming into operation, the proponents will be required to submit an operations management plan and a monitoring program for the Authority's approval as well as posting a substantial bond.

Commonwealth and Queensland Government agencies have co-operated in the assessment of this project and other developments.

THE FUTURE

The main challenge to the Park Management Section for the next three years remains the establishment of effective management over all sections of the Marine Park with limited resources in a time of necessary economic restraint on public sector expenditure. It is likely that, with the expected growth in usage of the Marine Park, particularly tourism, an increasing responsibility for the Authority in park management will be the control of environmental impacts from offshore structures. Resolution of conflicts between user groups is also expected to become a more frequent management issue. Successful resolution of these matters will continue to depend on public and governmental co-operation.

In meeting these challenges there is a continual examination of management methods to ensure the highest possible efficiency with limited resources and to minimise regulation of users.



EDUCATION AND INFORMATION

In keeping with the legislative requirements and the Authority's goal and aims, the Education and Information Section provides advice, education, and information materials and services that help the community understand and accept the provisions of Marine Park zoning and regulations.

Since 1975 the Authority has prepared or initiated zoning plans for the entire Marine Park. There is now a greatly increased demand to service this achievement. Written requests for information increased 29% over 1984-85 figures and similar increases have occurred in telephone and personal contacts with the public.

Reef user groups and the community at large have recognised the benefits of Reef management and are increasingly seeking education and interpretive support. Neither the community nor the Authority regard the emplacement of management plans and the associated elaborate communications structures as any more than the first stage in the development of responsible attitudes in Australia that will see the Reef into the 21st century.

Successful implementation of management plans will require education of users since there must be great reliance placed on self-regulation by the Marine Park users. Ideally, a national attitude that encourages wise use of the Great Barrier Reef Marine Park should also be promoted.

There have been problems coping with the enormity of the task and much effort in the last 10 years has concentrated on the provision of information and developing communication structures.

There is now a deliberate intention to gradually alter the bias of emphasis from information provision to education-oriented activity in the belief that an educated (versus simply informed) community will be more capable of responsible self-regulation.

Opposite: Many corals spawn en masse during five or six nights in late spring or early summer in the spectacular **Annual Coral Spawning Event on the Great Barrier Reef.** Here an egg and sperm bundle three to four millimetres across and containing hundreds of eggs is squeezed through the mouth of a coral polyp (Goniastrea palauensis) and is launched into the sea.

The emphasis of the education program is directed through three channels:

- the extension program, aimed specifically at Reef user groups
- the formal education program, designed to develop curriculum materials and services for teachers and students
- the community education program, designed to promote understanding and support for the Marine Park concept by the community at large.

The Education and Information Section also provides general services support by publishing statutory and research materials and maintaining a specialised library service available to the Authority, its staff and the general public.

Not surprisingly there have been problems:

- loss of experienced good staff due to promotion out of Townsville
- containing Reef user-group expectations of support (in the form of materials or assistance) within our capacity to provide it
- maintaining smooth development of major projects like 'Project Reef-Ed' over three years and three states
- maintaining effective links with the media especially those in southern states
- having to advance simultaneously into all the very diverse facets of providing education and information services.

Certainly, communication via the electronic media is fast and effective but it is so costly that we can anticipate doing only a minimum of what could and perhaps should be done in trying to educate and inform, and to develop good attitudes towards the Marine Park in all Australians.

EXTENSION SERVICES

People use the resources of the Great Barrier Reef in a variety of ways. A practical management strategy for the Marine Park must take into account particular user group needs and direct specific attention to those groups. Direct contact with recreational and commercial fishermen, charter boat operators, resort managers, private boat owners, divers and scientists establishes a two-way flow of information which assists the Authority in developing and reviewing interpretive materials that explain the provisions of zoning plans, regulations and the Marine Park concept.

During 1985 the Authority's newly created extension services subsection began work on the development of operational guidelines in collaboration with Q.NPWS officers and on the development of the extension program.

From February to April 1986 the Extension Officers were actively involved in the conduct of the public participation program for the southern sections (Capricorn and Capricornia). This required an extensive trip to the coastal and inland centres adjacent to these sections, in order to establish contacts, arrange display venues and liaise with the local media.

As a means of increasing public awareness of the importance of the Great Barrier Reef to Australia and the world, thirty plaques commemorating its inscription on the World Heritage List have been produced. These will be installed at major tourist destinations and departure points on the Great Barrier Reef and at adjacent coastal centres. It is intended to also place a number of the plaques underwater. All of the plaques should be in place by the end of 1986.

In May 1986 the local Rockhampton television station approached the Authority for assistance in the production of two ten minute television programs for the local magazine program **Capricorn Walkabout**. The Authority's involvement included the provision of technical advice for the script, advice on appropriate storyline and the provision of staff for oncamera interviews.

Q.NPWS Marine Park Rangers from Rockhampton were also involved in the interviews conducted at Heron Island. The first of the two programs presents a general overview of the Marine Park concept; the other focusses on the zoning process and public participation. Both programs will be useful educational tools.



Explaining the concept of the Marine Park and the role of the Authority and other agencies, especially Q.NPWS, in its management is an ongoing activity. Authority extension officer, Calvin Tilley, was interviewed for a program produced by the local Rockhampton television station.

FORMAL EDUCATION

The Authority continued its efforts to reach and educate school students — the future users of the Marine Park.

Project Reef-Ed, a major curriculum project started in 1982, entered the final stage of development. Work on the project, which aims to produce a comprehensive **Teachers Handbook for Great Barrier Reef Fieldwork**, has been carried out by a team of educators from Queensland and New South Wales.

The project team finalised a draft manuscript for the handbook during the year. This draft will be circulated in late 1986 to a number of experts from various disciplines for comment. Publication of the handbook should take place in early 1987 with a final product being available to teachers in mid 1987.

Two issues of **Ebb and Flow**, a broadsheet newsletter aimed at both students and teachers, were produced during the year. This newsletter presents facts about the Reef and the Marine Park as well as suggestions of things to do and places to visit. It has proved very popular with its intended audience.

Realising the importance of educating and supporting teachers interested in incorporating the study of the Great Barrier Reef in their teaching programs, the Authority financially assisted nine educators to attend the 2nd National Conference of Marine Educators held at the Gold Coast in December. The conference was an overwhelming success attracting over 100 participants from all over Australia. Representatives of both the Authority and Q.NPWS attended. One of the outcomes of the conference was the formation of the Marine Education Society of Australasia (MESA). The Authority has agreed to assist the fledgling organisation by subsidising its newsletter, the first issue of which will occur in August 1986.

Two community education courses were conducted during the year under the joint sponsorship of the Authority, the Townsville College of TAFE, and the Townsville Heritage Society. The courses titled **Revealing the Reef** were extremely popular, attracting a combined enrolment of 250 people. Participants travelled to John Brewer Reef off Townsville aboard the Reef Link and were provided with first hand experiences with some common reef creatures and illustrated lectures about the Marine Park. They also received educative commentaries while viewing the reef from a semi-submersible vessel, the 'yellow sub'.

During the year, the Authority along with the Queensland Department of Mapping and Surveying, the University of Queensland Press, the Queensland Tourist and Travel Corporation and the Q.NPWS initiated a project to produce a guide to the Great Barrier Reef and coastal Queensland including the sand islands south of the Great Barrier Reef Marine Park. A concept for the publication has been agreed upon by the parties involved and it is expected that the finished product will be available to the public late in 1987. The contents will include marine park zoning information, details of coastal and island national parks, island resorts of the area and general information on a range of Reef-related topics including history, weather and of course its natural aspects.

COMMUNITY EDUCATION PROGRAM

The Authority believes that it is important for all Australians to develop an increased awareness and understanding of the Reef and Marine Park. The community education program uses a variety of techniques and approaches to achieve this.

Reeflections, a community newsletter, provides the reader with articles on a wide range of Reef-related topics, Marine Park management, and acts as a forum for discussion of important Reef issues. Two issues were produced in 1985-86 covering topics as diverse as whales, Cape Tribulation fringing reefs, mangroves and the Wonderland Aquarium.

Posters have a broad appeal and introduce the Marine Park concept in an unobtrusive way. The Authority's **Ours to use wisely** poster series has proved so popular that the series was revamped and three new images produced. The series now consists of six exciting and colourful reef pictures. This new series has had an overwhelming response, to the extent of a hotel chain wishing to purchase large quantities to display in all its rooms.

The series of single-topic information brochures titled **Reef Notes** has enjoyed enthusiastic response from the public and educators alike. This series has been expanded with ten pamphlets currently in the series and another three in the pipeline for production by the end of 1986. The authors come from a variety of disciplines and institutions. They are all acknowledged leaders in their fields. The brochures are written in an entertaining, non-academic style and are printed in full colour with excellent illustrations.

Reef Notes display the identity, **Marine Parks**, as they are a joint project of the Authority and Q.NPWS. The Marine Parks logo has been used extensively to increase public awareness of the co-operative management of the Great Barrier Reef since the design of the joint identity and guidelines for its use were agreed upon by the Authority and Q.NPWS in 1985. The logos of both organisations are placed side by side to represent the unity and resolve of the Commonwealth and Queensland Governments to conserve, manage and promote the Great Barrier Reef. Consistent application of the joint logo will enable the public to easily recognise and respond to the various components of Marine Parks' management. The visual identity of Marine Parks was this year placed on signs, print material, promotions, uniforms, major plant and equipment and on buildings.

Marine Parks

Great Barrier Reef Marine Park Authority

Late in 1985 the Authority was approached by Ms Geraldine Carlin, the author of a story for children about the life cycle of a coral polyp. The story was illustrated by children's paintings produced as a result of a competition held in conjunction with the Western Australian Education Department. Authority staff quickly saw the potential of the book and undertook to publish it. The result is a delightful, entertaining book which introduces young readers to the coral polyp and its interaction with other reef inhabitants. The book, simply titled **Polyp**, has been widely acclaimed by educators throughout Australia.

During 1985-86 the Authority expanded its horizons in the field of radio and television. Use of the electronic media is seen as essential for contacting large groups of the community.

In conjunction with the local ABC radio station, 4QN, Authority staff participated in a series of weekly 'on air' radio interviews that were designed to give the Authority and its staff a public face. These interviews discussed various aspects of the Authority's work, from planning and managing the Marine Park to educating Reef users.

An important initiative in 1985 was the move into television productions. Two 'Community Service Announcements' were produced for the national television networks. These programs were produced at minimal cost to the Authority and received numerous comments on the aesthetic appeal and production quality from television networks across Australia. As a result, both programs received Australia-wide viewing at a level that would normally be financially prohibitive if the programs had been traditional 60second paid commercials.

The public participation programs for the Central Section and the southern sections were also taken into the homes of Reef users in the coastal communities with the production of television advertisements in support of these campaigns. Indications are that the advertisements were successful in motivating a positive public response whilst at the same time increasing public awareness.

Much of the impetus for this television involvement came from an officer of the State Electricity Commission of Victoria, Mr Dale Bromley, who worked with the Authority in Townsville for six months under the Public Service Board's Interchange Program.

The Authority has contracted an independent film production company to investigate the feasibility of producing a television series on **Man and the Reef**. Negotiations are underway to pre-sell the series to a television network. Authority staff will work with the film crew to ensure the script is technically and conceptually correct. The contract will also allow the Authority free access to all the film footage taken during production. This should greatly improve the Authority's film library.

Poetry in Pictures, the Great Barrier Reef presents a unique view of the Reef. This book of poetry, by Mark O'Connor, is illustrated by one of the Reef's most avid photographers, Neville Coleman. By providing a grant to publish this book, the Authority hopes to enhance the reader's pleasure and interest in the Great Barrier Reef and to reach yet another group of people.

Another publication to receive financial support from the Authority was the November 1985 edition of **Corella**. Published by the Australian Bird Study Association, this issue features seabird islands of the Great Barrier Reef and has proved a most valuable reference.

Throughout the year staff of the Education and Information Section designed and constructed displays to meet a variety of needs. Display venues included the Australian Coral Reef Society annual general meeting, Australian Society of Fish Biology meeting, the Cairns Boat Show and a display on clam

Opposite: **Fringing Reefs** can be as spectacular and varied as the outer reefs. Here, Lizard Island's reefs and deep lagoon make an impressive sight.



mariculture for the Australian Marine Science Association meeting in February 1986 which was addressed by Authority staff. A display on remote sensing was constructed for the 10th Canadian Symposium on Remote Sensing which was held in Edmonton, Canada and attended by an Authority staff member.

Education and Information Section staff also produced media releases and a range of articles on the Marine Park for newspapers, journals and magazines throughout the year.

PUBLIC PARTICIPATION

The Education and Information Section is also responsible for the planning and execution of the Authority's public participation programs. This requires close liaison with the Planning Section.

The public participation program for each Marine Park section involves a multi-faceted approach. Television, radio, personal contact, displays, maps and brochures are all used throughout the first three-month period of public participation to elicit public input into the zoning process and again in the second phase of public participation.

The Section arranges the production of explanatory materials such as zoning maps and mail-back brochures to assist the Authority in gaining relevant zoning information. Free-standing and counter-top displays have been developed to attract attention in venues such as shopping centres, libraries and newsagencies.

This year television and radio advertising were used extensively in the public participation programs.

In addition, Authority staff were available in regional centres such as Rockhampton and Mackay for interview by the media. This media coverage allowed the public participation program and the Authority to receive wide exposure to a large cross-section of the community.



Television advertising was used extensively in the two public participation programs conducted during the year. Filming took place at Wheeler Reef for the advertisement to alert the public to the review period for the Central Section draft zoning plan.

The community response to the Authority's public participation programs is encouraging. Four hundred and ninety submissions from groups and individuals were received at the completion of the second phase of the Central Section campaign. Two hundred and ninety-eight representations were received for the first phase of the southern sections campaign. These public participation programs are reported in greater detail in the Planning segment.

FREEDOM OF INFORMATION

The Authority received two requests under the **Freedom of Information Act** (FOI) during 1985-86. These requests were withdrawn when the inquirers realised that the information they sought was already available.

The Authority has fulfilled its statutory obligation under FOI by implementing internal procedures for processing requests, by updating as required the documentation called for under sections 8 and 9 of the FOI Act, and by regular reporting. Responsibility for granting or denying access to documents rests with the Executive Officer for requests made to the Authority, and with the Secretary of the Great Barrier Reef Consultative Committee for requests made to that body. Responsibility for review of decision rests with the Chairman of the Authority and Committee respectively.

LIBRARY

The function of the library is to provide an information service, based on published material, to assist the staff of the Authority in the execution of their duties. To fulfil this function the library acquires and controls a collection of material, provides a wide range of reference, bibliographic and current awareness services, and publishes a computer held bibliographic database. Co-operation with other libraries is actively pursued in order to make maximum use of resources.

The library collection includes monographs, periodicals, photographs, slides, films, pamphlets, posters, maps and charts. Although its emphasis is on the Great Barrier Reef, subject coverage is wide and includes collection strength in the areas of tourism and environment, environmental management, national parks and government administration.

The library is heavily used and demand for services increases with each increase in Authority staff or addition to Authority activities. Inevitably, given static library resources, the quality of reference service has deteriorated during the year under review.

The **REEF** database, which aims to index all published items about the Great Barrier Reef, achieved a new status during the year when it became available to library and research workers throughout the country via Australian Consolidated Industries' public access system AUSINET. REEF not only provides an invaluable reference tool helping to meet the needs of the Authority and its staff, but also assists in the dissemination of information to research workers and the interested members of the public.



RESEARCH AND MONITORING

The Research and Monitoring Section provides information for the effective planning and management of the Marine Park. The Section's activities are based on the function specified in the Act which empowers the Authority to commission research or conduct research itself. In practice most of the research for the Authority is conducted by universities, government research agencies and private consultants under contract to the Authority. The Section is also responsible for developing and implementing monitoring strategies for the Marine Park in association with the Queensland National Parks and Wildlife Service (Q.NPWS).

The Authority's research program must meet varied information requirements. Each annual program is usually a mix of projects covering marine natural sciences, marine engineering and the social sciences. Some projects themselves are multi-disciplinary. For reporting purposes, projects are classified into the categories shown in Figure 8. The distribution of funds amongst these categories in 1985-86 is shown in Figure 7. Of the total 127 projects in progress, 82 received funds from the 1985-86 Research and Monitoring allocation. The remaining 45 projects continued from previous years but received no additional funds. Fifty-seven projects commenced this year. Details of each project are summarised in Appendix D.

The Augmentative Research Support Grants Scheme drew a record 38 applications in 1986. Twenty-three grants were awarded. This scheme provides additional funds, of approximately \$900, to assist recent graduates and post-graduate students to undertake research in the Great Barrier Reef Region. Thirteen grants for the 1985 academic year are included in the project totals in Figure 8.

Opposite: The white limestone skeleton of this coral colony (Acropora sp.) is a clear indication that the **Crown of thorns** starfish has eaten the resident polyps. A major research program to understand this spiny starfish commenced during this year.

A basic aim for Research and Monitoring in 1985-86 was to continue to provide useful information for the Planning, Park Management and Education and Information Sections. Other objectives were to:

- establish a co-ordinated research program on the crown of thorns starfish
- initiate research into the impacts of trawling
- initiate reviews of major research areas
- further develop methods of monitoring.

With the specific provision of an additional \$971 000 in this years budget, the establishment of the research program on crown of thorns starfish was the major achievement of the year. Unfortunately the lack of forward commitment in the program prevented the appointment of a full-time co-ordinator and assistant. Their functions fell upon existing staff of the Research and Monitoring Section. As a consequence, limited progress was made on two important activities planned for the year, namely, the review of major research areas and the development of methods and resources for monitoring.

Two major projects described in last years report, the Cape Tribulation monitoring program and dugong management, progressed as planned during the year. Both these projects will be collecting data over the next one to two years.

Effective administration of the annual research and monitoring program and planning to meet future demands, requires co-ordination and liaison between the Authority and a number of research organisations and funding bodies. Significant among these in the year under review were: Q.NPWS, the Australian Institute of Marine Science (AIMS), the James Cook University of North Queensland (JCUNQ), the Queensland Department of Primary Industries (Q.DPI) and the Marine Research Allocations Advisory Committee (MRAAC).



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The Authority continued to meet its responsibility for reporting on research in the Great Barrier Reef Region through its financial commitment to, and staff involvement in, the database 'Australian Marine Research in Progress' (AMRIP). Discussions have started with other interested agencies on the establishment of a Marine Research And Management Information System (MARAMIS), initially for South East Asia and the Pacific, based on the AMRIP model.

Progress on major or topical areas of this years program is described below.

CROWN OF THORNS STARFISH

Although the coral-eating starfish continued to be a major problem in the past year, initial analysis of survey results suggests that infestations (more than 40 starfish per dive) are now at the lowest level for several years and are confined to the Central Section. These are the preliminary findings from the survey of 228 reefs along the entire Great Barrier Reef undertaken by AIMS under a project funded by the Commonwealth Community Employment Program.

The House of Representatives Standing Committee on Environment and Conservation conducted an enquiry on protection of the Great Barrier Reef in 1985. With respect to crown of thorns starfish, it recommended that the Commonwealth provide long-term funding for further research, that the Authority monitor the Reef for infestations of the starfish, that the Authority give urgent priority to developing more effective control techniques, and that the Authority test the usefulness of using teams of volunteer divers to hand control starfish. A control program using Royal Australian Navy divers will be conducted in July 1986 to evaluate the effectiveness of volunteers using various techniques.

The research program established this year follows from the recommendations in the January 1985 report of the Crown of Thorns Starfish



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Advisory Committee (COTSAC) which was briefly reported last year. To ensure the widest possible review of the program, the Authority established the Crown of Thorns Starfish Advisory Review Committee (COTSARC) chaired by Professor John Swan, the immediate past Chairman of the Australian Marine Science and Technology Advisory Committee (AMSTAC). Members of COTSARC have extensive experience of research or socioeconomic aspects of the crown of thorns phenomenon in Australia and overseas. The committee met in February to consider the proposed program.

The recommended program consists of 45 projects involving more than 50 senior scientists from many research institutions. The Authority is coordinating the overall program, with responsibility for the co-ordination of the ecological components being delegated to the Australian Institute of Marine Science. This program is probably the most intensive co-ordinated research effort ever conducted in Australian waters on a non-commercial species. The research projects being undertaken are listed in Appendix D. Examples of management-oriented projects being funded within the program follow.

A study of the water mass characteristics of the Great Barrier Reef Region will determine if there is a relationship between plankton productivity and the starfish infestation. This study is made possible by the satellite-borne experimental Coastal Zone Colour Scanner using the micro-BRIAN computer program developed by CSIRO for the Authority.

Two studies being conducted at JCUNQ are investigating the natural diseases of the starfish, looking for a potential biological control.

An important investigation is being conducted by Associate Professor R. Henderson of JCUNQ, in collaboration with the Bureau of Mineral Resources. They have obtained encouraging early results in the search for evidence of previous infestations in the sediments beneath the surface of some reefs. The aim is to determine whether infestations have been more frequent or intensive since European settlement of Australia. The answer will determine whether or not it is appropriate to treat infestations as a natural occurrence in the Reef system.

Opposite: Evaluating the effectiveness of various control techniques and feasibility of using volunteer divers is part of the major research program on crown of thorns starfish which began during the year. A volunteer diver injects starfish with copper sulphate solution, the most effective killing agent found to date.



IMPACT OF OK TEDI ON THE GREAT BARRIER REEF

In 1985 sufficient concern was expressed about the possible impact of heavy metals (and sediment) from the Ok Tedi mine in Papua New Guinea reaching Australian waters and possibly the far northern Great Barrier Reef, that an Inter-Departmental Committee on the topic was established. The Authority participants on this Committee held discussions with representatives from the Ok Tedi mine and Papua New Guinea Government on the subject. The Authority is currently maintaining a watching brief and is collaborating closely with other interested agencies on the issue.

CORAL AND TROCHUS

Economic and biological characteristics of the coral collecting industry were reported on by Mr James Oliver from JCUNQ as the result of a two-year study on the fishery. The fishery was found to be worth about \$90 000 a year, and at current levels of collecting, the impact on the Great Barrier Reef does not appear to be major. Management guidelines for the industry are currently under discussion.

Another collecting fishery, the trochus fishery, was also reported on in 1986. The study by Mr Warwick Nash, then of the Q.DPI which jointly sponsored the study, suggests a Reef-wide catch of 500 tonnes of trochus per year. Management guidelines are under discussion with the relevant agencies based on the findings for recruitment, growth and distribution factors.

CAPRICORNIA SECTION USER SURVEY

As part of the review of zoning of the Capricornia Section of the Marine Park, a study has been undertaken of the attitudes of users of this Section to the zoning and management. The survey was designed by consultants, Environment Science and Services, with the assistance of staff of the Authority and Q.NPWS.

Thirteen separate user groups were identified and sample methodology and sample numbers were selected for each group to be adequately represented. The groups chosen represent the majority of regular and occasional users of the Capricornia Section.

Results indicate a favourable overall response to the Zoning Plan and day-today management, while indicating some areas where extension effort could be focussed. While most user groups thought that the plan had helped protect the Reef, and was a wise use of public money, they did not appear to have been convinced that some extractive activities (e.g. fishing and collecting) and reasonable use are an integral part of the Marine Park philosophy. An encouraging finding was the relatively low percentage of respondents who felt that they had been disadvantaged by the current Zoning Plan even though it may have caused them to change their previous use of the Section. Commercial fishermen feel that they have been more disadvantaged by the Zoning Plan than other groups. Other groups appear to feel opportunities for commercial fishing should be reduced when the Zoning Plan is revised.

OFFSHORE DAMAGE FROM CYCLONE WINIFRED

On 1 February 1986, tropical cyclone Winifred crossed the north Queensland coast near Innisfail. Onshore damage was severe. Detailed assessment of offshore damage was arranged on this occasion because scientists from AIMS and JCUNQ had been working in the area in the weeks before the cyclone. The surveys revealed extensive coral damage to a depth of around 15 metres on reefs in the path of the cyclone. Coral damage was not perceptible by aerial survey, although spectacular river plumes were evident as far out as the main Reef tract. Periodic follow-up surveys will investigate recovery rates of the corals and associated communities.

A workshop to discuss the early findings was held in Townsville in June 1986. The proceedings will be published.

REEFPLAN

Several years ago the Authority asked the Federal Department of Transport to develop a contingency plan in the event of an oil spill in the Great Barrier Reef Marine Park. The Department is the agency responsible for the National Plan to Combat Pollution of the Sea by Oil. The plan called REEFPLAN, has recently been accepted in principle by the Authority. It provides the framework for an oil spill response based on the 'polluter pays' principle. Under REEFPLAN the Authority has a number of duties which include the provision of scientific advice through its Scientific Support Co-ordinator (SSC) and the appointment of a Media Liaison Officer (MLO). Responsibilities of the SSC include relevant research advice on counter measures planning, shipping lane designation, environmental evaluation of incidents, identification of sensitive areas, training and planning. Responsibilities of the MLO include co-ordination of advice to the media, arranging interviews, filming and communications planning. The Authority accepts its role based on its statutory responsibility for protection of the Great Barrier Reef, but is concerned about the provision of resources required by REEFPLAN.

THE FUTURE

Review of major program areas in order to update priorities continues to be an objective for 1986-87. A review of physical oceanography and the application of remote sensing are high on the list. Continuation of the two to three year studies begun this year on crown of thorns starfish is essential to ensure the integrity of the COTSAC-recommended program and to ensure that the benefits of co-ordination and management focus are achieved. Further development of monitoring strategies is another important objective for 1986-87. This will require continued close co-operation with Q.NPWS.



ADMINISTRATION

The Administration Section co-ordinates financial and human resource management and is responsible for purchasing, accounting, property, personnel, travel, word processing and registry and general services. The emphasis in human resource management is to improve the performance of the office through flexibility of organisation and the careful recruitment and development of staff. Financial management aims to minimise the cost of developing and caring for the Marine Park consistent with meeting the goal and aims of the Authority, as derived from the Act.

Within the limits of Authority direction and regulation, the Section seeks to meet particular operating needs through informality and simplification of procedures and systems. The use of modern technology is an important element.

HUMAN RESOURCE MANAGEMENT

With the changing emphasis from planning to management of the Marine Park it is necessary, in selecting staff, to focus on a combination of skills, experience and qualifications which will anticipate future redeployment needs.

Organisational flexibility requires the employment of people who have already demonstrated versatility, not only in a technical sense, but also in relation to management and policy requirements. However, this emphasis does not preclude the employment of people with outstanding specialist skills provided they have shown versatility.

From a structure of 75 positions, 13 were advertised for filling within approved average operative staffing levels. The approved operative staffing level (AOSL), for 1985-86 was 70.25 and the actual average for the year was 70.15. The figures for 1984-85 were 64 and 63.8 respectively.

Until this year the Authority relied to a large extent on temporary staffing to meet the effects of high turnover and recruitment delays. While turnover in 1985-86 remained high at 38 staff (54% of AOSL) the number of temporary staff reduced from 21 (32% of AOSL) at 30 June 1985 to 9 (13% of AOSL) at 30 June 1986. This development reflects improved recruitment management

Opposite: Knowledge of the habits of **Seabirds** and understanding their needs are important if humans and seabirds are to continue sharing our Great Barrier Reef.

and processing. Greater stability should occur but the incidence of extended leave plus the ability of staff to gain positions elsewhere are expected to result in turnover remaining at a relatively high level. This seems to be an inevitable result of locating a specialist agency which employs many professionals under the Public Service Act in Townsville.

Job design and selection criteria have always reflected a policy of equal employment opportunity. The Public Service Reform Act 1984 formalised the requirement for agencies to introduce programs designed to eliminate discrimination and to ensure that measures are taken to enable women and persons in designated groups to compete for jobs as effectively as other people. A policy and strategy were developed during the year.

The Public Service Reform Act also requires the development of plans designed to achieve appropriate participation by officers and employees in the decision making processes of an agency. During the year an industrial democracy plan was developed in consultation with all staff and distributed to staff associations as a basis for consultation.

In accordance with his powers under section 27 of the Public Service Act, the Chairman created the following positions during 1985-86:

Planning

Computer Systems Officer, Grade 1 Data Processing Operator, Grade 2

Education and Information

Graphic Designer, Grade 1

Administration

Storeman.

Due to changes in work value the following positions were reclassified:

Park Management

From Clerical Administrative, Class 9 to Class 8

Education and Information

From Typist Grade 1 to Clerical Assistant, Grade 5.

Figure 9 shows the distribution of staff at 30 June 1986.

In implementing its personal development program, the Authority selects from a number of training opportunities offered by the Public Service Board and management consultants. While most courses are still away from Townsville, the Public Service Board and other organisations are increasingly attentive to training needs in North Queensland. During the year the Authority and other agencies co-operated in the conduct of two management skills workshops in Townsville. Work-related conferences and seminars also contribute to professional development. The Authority also enjoys a number of occasional presentations by visiting and staff experts.

The continued health and safety of staff is important. Due to the incidence of repetitive strain injury (RSI), education and other preventative measures for operators and authors were increased. The emphasis is placed on job variation, ergonomic workstations and support for staff who contract RSI. Staff comments on 'smoking in the workplace' have been sought and are the basis for a draft policy discouraging smoking. Eyesight testing for screen

| Figure 9 NUMBER AT 30 JUN | OF STAFF IE 1986 | PERMANENT | TEMPORARY | TOTAL |
|---------------------------------|---------------------------|-----------|-----------|-------|
| Townsville | : Executive | 2 | | 2 |
| | Research and Monitoring | 5 | 1 | 6 |
| | Planning | 13 | | 13 |
| | Park Management | 9 | | 9 |
| | Education and Information | 10 | 4 | 14 |
| | Secretariat | 2 | | 2 |
| | Administration | 15 | 3 | 18 |
| | Aquarium | 2 | | 2 |
| | Inoperative | 5 | | 5 |
| | TOTAL TOWNSVILLE | 63 | 8 | 71 |
| Canberra: | Executive | 2 | | 2 |
| | Administration | 1 | 1 | 2 |
| | TOTAL CANBERRA | 3 | 1 | 4 |
| TOTAL | | 66 | 9 | 75 |

based operators continued and staff who SCUBA dive in connection with their duties undergo annual medicals. Publicity is given to sporting and recreational activities which encourage healthy lifestyles.

FINANCIAL MANAGEMENT

In the 1985-86 budget, Parliament appropriated \$6 384 000 for the Authority's activities. Further funds totalling \$246 000 carried forward from 1984-85 were also available. Under the cost-sharing arrangements for day-to-day management of the Marine Park, receipts from the Queensland Government were \$750 000. Receipts from other sources, including the sale of information materials, amounted to \$102 000.

Expenditure for the year was \$6 969 000, 96% of funds available. Full details are provided in Appendix E. The expenditure of funds by program is shown in Figure 10. This figure reflects the allocation of salaries and overheads to each Authority program.

During the year, considerable effort went into a major redevelopment of the computerised accounting and financial management system and revision of the form of financial statements. Teething troubles with the VAX 11/750 and the novelty of programs to handle public accounting requirements on the UNIX/ORACLE system have caused delays but the system will be operational in 1986-87.



GENERAL SERVICES

The office occupies the ground and four other floors of Melton Place, 67-71 Denham Street, Townsville. This inner city location provides essential public accessibility and some facilities for public information, display and reference library purposes. The Great Barrier Reef Wonderland Bicentennial Complex will provide a better permanent location for the Authority in Townsville. It is planned to relocate the office in 1987-88.

Word processing is a most important service to the organisation. It was affected during the year by cases of repetitive strain injury requiring redeployment. As stated earlier, the investigation and adoption of preventative measures remains a high priority.

A stocktake of Authority assets was undertaken and found to be satisfactory. An improved system for the recording, control and maintenance of assets was implemented during the year.

THE FUTURE

In line with the Authority's aim to adapt the Marine Park and the operations of the Authority to changing circumstances, a major organisational review began in April 1986. Future planning will pay special attention to emerging policy issues such as offshore developments, the changing emphasis from planning to management and the integration of information systems.

Once the finance system is implemented, Administration Section will be involved in computerising human resource management systems. The staff development and training program will continue with the objective of increasing the skills, job satisfaction and self-regard of staff.

The Department of Arts, Heritage and Environment will formally adopt program budgeting in 1987-88. The goal, aims and operation of the Authority already reflect this process of resource management and it will be able to contribute constructively to the development of a portfolio format.

The Section also looks forward to its close association with detailed planning for office accommodation and corporate support requirements in Great Barrier Reef Wonderland.



AQUARIUM

The inclusion of Great Barrier Reef Wonderland in the Commonwealth-State Bicentennial Commemorative Program was announced jointly by the Premier of Queensland, the Hon. Sir Joh Bjelke-Petersen and the Minister for Arts, Heritage and Environment, the Hon. Barry Cohen, on 28 September 1984. An allocation of \$6 million (in 1982 prices) of bicentennial funds was made to the project.

The objectives and components of Great Barrier Reef Wonderland are:

- to establish a national monument on the occasion of the Australian Bicentenary which will offer interpretive and educational services about the Great Barrier Reef for local, national and overseas visitors, and thus contribute to management of the Great Barrier Reef Marine Park
- to recognise and record in an enduring manner the roles of the Queensland and Commonwealth Governments in the conservation of the Great Barrier Reef, and its inscription on the World Heritage List
- to develop Great Barrier Reef Wonderland as a tourist attraction of international status, with an integration of outstanding facilities having wide appeal and involving Government and private sector funding.

These facilities include:

- an aquarium accommodating a functioning coral reef system with a walk-through viewing tunnel providing a 'Reef experience' which is fascinating and realistic, stimulating the visitor to further explore the Great Barrier Reef (Bicentennial funding)
- a branch of the Queensland Museum concentrating on the natural sciences, history, culture and development of North Queensland and providing, amongst other things, specialist exhibits relating to the Great Barrier Reef (Bicentennial funding)
- Omnimax cinema and commercial precinct of shops, offices, food outlets and charter boat services (Private sector funding).

Opposite: Tiny polyps of the hard coral, Turbinaria peltata, help build the Reef. **The Coral Polyp** lays down a skeleton of limestone and divides to create a coral colony.

Aquarium 61

Following the exhaustive evaluation of proposals submitted by several potential developers, the Great Barrier Reef Wonderland Association Inc., the body established to oversee the development of the project, selected Kern Corporation as the developer. Kern is investing \$14 million in the commercial elements of the project.

In September 1985 the Federal Government announced that it had approved additional funding for the Great Barrier Reef Marine Park Authority to enable it to operate the aquarium as an educational facility about the Great Barrier Reef and management of the Marine Park and to move its Townsville staff to the office building in the Wonderland complex.

Contracts were signed soon after and construction commenced in November 1985. Construction has proceeded on schedule with the aquarium building expected to be completed in December 1986. The Great Barrier Reef Wonderland complex is due to open to the public on 24 June 1987.

The Great Barrier Reef Wonderland Aquarium Advisory Committee, a group of experts appointed by the Authority to provide unpaid technical advice on the aquarium and associated displays, met in March 1986 to review progress with construction and to advise on outstanding technical issues.

During the year a sub-committee of educational experts was formed to develop a design brief for the public education and interpretive displays to be provided in the aquarium complex. This brief was completed in August 1985. Proposals were sought from several leading museum/exhibition display firms and following evaluation of these, a Melbourne based firm, ACUMEN Communication, Planning and Development Pty Ltd, was selected to undertake the design and fitting out of the display areas. Funds for this part of the project will be sought from the public.

Within the Authority, a Project Engineer and an Administrative Officer have been appointed to handle the Authority's involvement in Great Barrier Reef Wonderland. Fourteen staff for the aquarium will be recruited progressively during 1986-87.

Opposite: The 17-metre tunnel (foreground) features curved acrylic windows which will allow visitors to closely observe coral reef communities in the tanks of the Great Barrier Reef Wonderland aquarium. Construction of the aquarium began in November 1985. The Wonderland complex is due to open in June 1987.

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APPENDIX A AUTHORITY SENIOR OFFICERS

Townsville Office: Dr Don Kinsey (Executive Officer) Richard Kenchington (Assistant Executive Officer, Planning) Dr Wendy Craik (Assistant Executive Officer, Research and Monitoring) Simon Woodley (Assistant Executive Officer, Park Management) Ray Neale (Assistant Executive Officer, Education and Information) David Chippendale (Assistant Executive Officer, Administration) Canberra Office: Peter Quilty (Acting Assistant Executive Officer)

Authority Senior Officers 63

APPENDIX B PUBLICATIONS AVAILABLE

BOOKS

Nomination of the Great Barrier Reef by the Commonwealth of Australia for Inclusion in the World Heritage List.

Townsville, GBRMPA, 1981. ISBN 0-642-52281-2.

Research Report 1976-1982. Townsville, GBRMPA, 1983. ISBN 0-642-52345-2.

Polyp. Geraldine Carlin. Townsville, GBRMPA, 1986. ISBN 07244-87174.

TECHNICAL MEMORANDUM/REPORT SERIES

Research on Fishes of the Great Barrier Reef. Wendy Craik. Townsville, GBRMPA, 1978. (Technical Memorandum GBRMPA-TM-1). 30p.

Fisheries Factors Affecting Marine Park Management. Wendy Craik. Townsville, GBRMPA, 1978. (Technical Memorandum GBRMPA-TM-2). 30p. GBRMPA-TM-3 not issued.

Amateur Fishing on the Great Barrier Reef. Wendy Craik. Townsville, GBRMPA, 1979. (Technical Memorandum GBRMPA-TM-4). 19p.

Report of Scientific Discussion Meeting on the Physical Oceanography of the Great Barrier Reef Region held at the University of New South Wales 5-6 July 1982. Jason H. Middleton. Townsville, GBRMPA, August 1983. (Technical Memorandum GBRMPA-TM-5). 42p.

Age Structure of the Fantome Island Fringing Reef. D.P. Johnson. Townsville, GBRMPA, 1985. (Technical Memorandum GBRMPA-TM-6). 26p.

Management of Dugong: An Endangered Marine Species of Traditional Significance. Claudia Baldwin. Townsville, GBRMPA, 1985. (Technical Report GBRMPA-TR-1). 26p.

WORKSHOP SERIES (ISSN 0156-5842)

Workshop on the Northern Sector of the Great Barrier Reef: Papers and Proceedings of a Workshop held in Townsville, 20-21 April 1978. Townsville, GBRMPA, 1978. (GBRMPA Workshop Series No. 1). 462p. ISBN 0-642-91150-9 [Reprinted August 1983].

Workshop on Reef Fish Assessment and Monitoring held at Heron Island, 18-28 November 1978. Townsville, GBRMPA, 1978. (GBRMPA Workshop Series No. 2). 64p. [Reprinted 1985].

64 Appendixes

Workshop on Coral Trout Assessment Techniques held at Heron Island 21 April-4 May 1979. Townsville, GBRMPA, 1979. (GBRMPA Workshop Series No. 3). 85p. [Reprinted 1985].

Papers and Proceedings of the Workshop 'Tourism and the Great Barrier Reef' held in Mackay 9-11 April 1979. Townsville, GBRMPA, 1981. (GBRMPA Workshop Series No. 4). 182p. ISBN 0-642-52273-1.

Workshop on Contaminants in Waters of the Great Barrier Reef: Proceedings of a Workshop held at Griffith University, Brisbane, Australia, 26 May 1984. Townsville, GBRMPA, 1985. (GBRMPA Workshop Series No. 5). 43p. ISBN 0-642-52401-7.

Workshop on Response to Hazardous Chemical Spills in the Great Barrier Reef Region: Proceedings of a Workshop held in Townsville, 3 August 1984. Townsville, GBRMPA, 1985. (GBRMPA Workshop Series No. 6). 107p. ISBN 0-642-52409-2.

SPECIAL RESEARCH PUBLICATION SERIES (ISSN 0810-6983)

Annotated Checklist of the Coral Reef Fishes in the Capricorn-Bunker Group Great Barrier Reef. Barry C. Russell. Townsville, GBRMPA, August 1983 [Cover title: Checklist of Fishes, Great Barrier Reef Marine Park Capricornia Section] (GBRMPA Special Publication Series (1)). 184p. ISBN 0-642-52313-4.

Fisheries of the Great Barrier Reef. Tor Hundloe. Townsville, GBRMPA, 1985. (GBRMPA Special Publication Series (2)). 158p. ISBN 0-642-52417-3.

Guide to the Identification of Seagrasses in the Great Barrier Reef Region. Janet Lanyon. Townsville, GBRMPA, 1986. [Cover title: Seagrasses of the Great Barrier Reef] (GBRMPA Special Publication Series (3)). 54p. ISBN 0-642-52489-0.

RESEARCH PUBLICATIONS

Green Island Economic Study. Economic Associates Australia. Townsville, GBRMPA, June 1983. 68p. ISBN 0-642-52337-1.

Data Review of Reef Related Tourism, 1946-1980. Australian Travel Industry Association (Queensland Board) Townsville, GBRMPA, June 1984. 120p. ISBN 0-642-52353-3.

Australian Marine Research in Progress : Great Barrier Reef Region, 1984-85. Townsville, GBRMPA, 1985. 245p. ISSN 0815-0087.

The Application and Potential of Remote Sensing in the Great Barrier Reef Region. David L.B. Jupp. Townsville, GBRMPA, 1986. 56p. ISBN 0-642-52449-1.

ANNUAL REPORTS (ISSN 0155-8072)

Annual Report 1981-82 Annual Report 1982-83 Annual Report 1983-84 Annual Report 1984-85

POSTERS

Capricornia Zoning Map. 1984. Cairns Zoning Map. 1983.

Publications Available 65
Portraits of the Reef. [2 prints + notes] Robert Ingpen. Ruskin Press, October 1981.

Dugongs. Reef Heritage Series. 1984. Joint Series GBRMPA and Q.NPWS.

Coral Trout of the Great Barrier Reef. 1985.

POSTERS - OURS TO USE WISELY SERIES

Turret Coral. 1986.

Clown Fish and Anemone. 1986.

Snorkelling at Heron Island Reef. 1986.

Reef Walking at North West Reef. 1986.

Gorgonia and Feather Star. 1986.

Aerial of Hardy Reef. 1986.

ZONING PLAN PUBLICATIONS

Capricornia Section Zoning Plan. Townsville, GBRMPA, August 1980. 30p. + separate map. ISBN 0-642-90275-5.

Cairns Section Zoning Plan and the Cormorant Pass Section Zoning Plan. Townsville, GBRMPA, November 1983. 16p. + maps. ISBN 0-642-52329-0.

Far Northern Section Zoning Plan. Townsville, GBRMPA, August 1985. 42p. + maps. ISBN 0-642-52433-5.

BROCHURES

Under Capricornia: a Guide to the Capricornia Section of the Great Barrier Reef Marine Park. GBRMPA, 1981.

An Introductory Guide to Life on the Great Barrier Reef. Photography by Len Zell and Bill Wood, GBRMPA, August 1981.

Introducing Capricornia: Capricornia Section, Great Barrier Reef Marine Park. Townsville, GBRMPA, May 1983.

Permits and Collecting : Capricornia Section, Great Barrier Reef Marine Park. Townsville, GBRMPA, May 1983.

Activities Guide: Capricornia Section, Great Barrier Reef Marine Park. Townsville, GBRMPA, May 1983.

Spearfishing: Capricornia Section, Great Barrier Reef Marine Park. Townsville, GBRMPA, June 1983.

Recreational Fishing: Capricornia Section Great Barrier Reef Marine Park. Townsville, GBRMPA, June 1983.

Diving: Capricornia Section, Great Barrier Reef Marine Park. Townsville, GBRMPA, June 1983.

Boating: Capricornia Section, Great Barrier Reef Marine Park. Townsville, GBRMPA, June 1983.

Commercial Fishing: Capricornia Section, Great Barrier Reef Marine Park. Townsville, GBRMPA, June 1983.

Great Barrier Reef Marine Park: Cairns Section and Cormorant Pass Section: Introduction. Townsville, GBRMPA. November 1983.

Great Barrier Reef Marine Park: Cairns Section and Cormorant Pass Section: Activities Guide 1: Lizard Island Area. Townsville, GBRMPA. November 1983.

Great Barrier Reef Marine Park: Cairns Section: Activities Guide 2: Offshore Cooktown. Townsville, GBRMPA. November 1983.

Great Barrier Reef Marine Park: Cairns Section: Activities Guide 3: Offshore Port Douglas. Townsville, GBRMPA. November 1983.

Great Barrier Reef Marine Park: Cairns Section: Activities Guide 4: Offshore Cairns. Townsville, GBRMPA. November 1983.

Great Barrier Reef Marine Park: Cairns Section: Activities Guide 5: Offshore Innisfail. Townsville, GBRMPA. November 1983.

Great Barrier Reef Marine Park: Far Northern Section: Introduction. Townsville, GBRMPA. February 1986.

Coral Reefs: A Review of Some Audio-Visual Resources. Townsville, GBRMPA. 1984. 12p. ISBN 0-642-52481-5.

Coral Reefs: a Reading List with Notes. Townsville. GBRMPA. 1985. ISBN 0-642-52473-4.

SERIAL PUBLICATIONS

Reeflections. (ISSN 0314-6510) Number 15, March 1985 Number 16, November 1985 Number 17, May 1986

Reef Notes. (ISSN 0814-9453). Joint Series GBRMPA and Q.NPWS Crown of Thorns. February 1985 Reef Region Fisheries. February 1985 The Coral Polyp. February 1985 The Soft Touch — Another View of Coral. February 1985 Coral Cays. July 1985 Fringing Reefs. July 1985 Turtles. July 1985 Seabirds. July 1985 The Great Barrier Reef. July 1986 The Annual Coral Spawning event on the Great Barrier Reef. July 1986

MAPS

The Great Barrier Reef Marine Park 1: 5 000 000. (A3 size, coloured) October 1984 (BRA Q75)

Companion Map to Great Barrier Reef 1: 2 200 000. (Strip map, coloured) April 1985 (BRA Q78)

Great Barrier Reef Marine Park Capricornia Section. Zoning Plan — Zoning Map 1: 1 000 000. (A3 size, coloured) August 1980 (BRA Q17)

Cairns Section, Great Barrier Reef Marine Park Zoning Plans — Zoning Map (2) 1: 300 000. (A3 size, coloured) May 1983 (BRA Q51)

Cairns Section, Great Barrier Reef Marine Park Zoning Plans — Zoning Map (3) 1: 300 000. (A3 size, coloured) May 1983 (BRA Q52)

Cairns Section, Great Barrier Reef Marine Park Zoning Plans — Zoning Map (4) 1: 300 000. (A3 size, coloured) May 1983 (BRA Q53)

Cairns Section, Great Barrier Reef Marine Park Zoning Plans — Zoning Map (5) 1: 300 000. (A3 size, coloured) May 1983 (BRA Q54)

Publications Available 67

Cairns Section, Great Barrier Reef Marine Park Zoning Plans — Zoning Map (6) 1: 300 000. (A3 size, coloured) May 1983 (BRA Q55)

MAPS — GREAT BARRIER REEF SERIES

Far Northern Section Zoning Plan Maps — Thursday Island 1: 250 000. (A1 size, coloured) August 1985 (BRA Q100)

Far Northern Section Zoning Plan Maps — Ashmore Reef 1: 250 000. (A1 size, coloured) August 1985 (BRA Q101)

Far Northern Section Zoning Plan Maps — Cockburn 1: 250 000. (A1 size, coloured) August 1985 (BRA Q102)

Far Northern Section Zoning Plan Maps — Weymouth Bay 1: 250 000. (A1 size, coloured) August 1985 (BRA Q103)

Far Northern Section Zoning Plan Maps — Tijou Reef 1: 250 000. (A1 size, coloured) August 1985 (BRA Q104)

Far Northern Section Zoning Plan Maps — Princess Charlotte Bay 1: 250 000. (A1 size, coloured) August 1985 (BRA Q105)

Far Northern Section Zoning Plan Maps — Lizard Island 1: 250 000. (A1 size, coloured) August 1985 (BRA Q106)

OTHER PUBLICATIONS

Australia with Reef Explorer Cruises: the Great Barrier Reef and Coral Sea. Joint publication with Reef Explorer Cruises, Townsville, 1982.

The Richest Reef. Young Australia Reader Series. Thomas Nelson, Australia and the Great Barrier Reef Marine Park Authority. Melbourne, 1983.

Australian Marine Research in Progress 1985. Australian Institute of Marine Science; CSIRO Central Information, Library and Editorial Section; Great Barrier Reef Marine Park Authority and Victorian Institute of Marine Sciences. (CILES/CSIRO), 1985.

Junior Survival: the Great Barrier Reef. Published for the Great Barrier Reef Marine Park Authority by the Gould League of Victoria with the assistance of the Australian Conservation Foundation. Melbourne, 1984.

Coral Reef Management Handbook. Editors R.A. Kenchington and Brydget E.T. Hudson. UNESCO. Jakarta, Indonesia, 1984.

A Coral Reef Handbook. Editors Patricia Mather and Isobel Bennett. The Australian Coral Reef Society. 2nd ed., Brisbane, 1984.

Plant Life of the Great Barrier Reef and Adjacent Shores. A.B. Cribb and J.W. Cribb. University of Queensland Press. St. Lucia, Queensland, 1985.

Poetry in Pictures: the Great Barrier Reef. Mark O'Connor and Neville Coleman. Hale & Iremonger. Sydney, 1985.

APPENDIX C STAFF PAPERS PUBLISHED/PRESENTED IN 1985-86

(Asterisks identify collaborators from other institutions.)

Baldwin, C. Management of the Dugong: an Endangered Marine Species of Traditional Significance. Marine Parks and Conservation: Challenge and Promise. J Lien, R Graham (Eds). National and Provincial Parks Association of Canada, 1985.

Barnes D J*, B E Chalker* and D W Kinsey. **Reef Metabolism.** Oceanus. 29(2) : 20-26, 1986.

Claasen D van R, R A Kenchington and T Shearn. **Managing Coral Reefs: Operational Benefits of Remote Sensing in Marine Park Planning.** Paper presented to the 10th Canadian Symposium on Remote Sensing, Edmonton, Alberta, May 1986.

Craik W. **The Great Barrier Reef Marine Park and Torres Strait.** Torres Strait Fisheries Seminar, Port Moresby 11-14 February 1985. A K Haines, G C Williams, D Coates (Eds). Canberra, AGPS, 1986.

Craik W. **Recreational Fishing on the Great Barrier Reef : Research Findings.** Fisheries Management : Theory and Practice in Queensland. T J Hundloe (Ed). Brisbane, Griffith University Press, 1986.

Craik W and J Gillies. **Coral Trout Surveys in the Great Barrier Reef Region.** Paper presented to the Annual Conference of the Australian Society for Fish Biology. Melbourne, August 1985.

Craik W. Great Barrier Reef Marine Park Authority Activities in Relation to East Coast Tuna. Paper presented to the East Coast Tuna Workshop, October 1985.

Craik W. Research on Marine Mammals supported by the Great Barrier Reef Marine Park Authority. Paper presented to the Marine Mammal Workshop, Canberra, March 1986.

Craik W. Longlining for Shark in the Great Barrier Reef Marine Park. Paper No. 12. Proceedings Shark Workshop, Cairns, December 1985. Queensland Fish Management Authority, 1986.

Craik W. Reef Fisheries. Oceanus. 29(2): 81, 1986.

Dartnall J. **Diving in the Deep End : Management of the REEF Database.** Proceedings of the First Asian-Pacific Special and Law Librarians' Conference. Melbourne, National Special Libraries Section, Library Association of Australia, 1985.

Staff Papers 69

Driml S M. **Fisheries Economics in Queensland : Its Infancy; Its Future.** Fisheries Management : Theory and Practice in Queensland. T J Hundloe (Ed). Brisbane, Griffith University Press, 1986.

Driml S M and G Kelleher. **Great Barrier Reef Management — the Role of Economics.** Proceedings of the Conservation and the Economy Conference, 1984. Canberra, AGPS, 1985.

Dutton I M. Integrating Approaches to Environmental Impact Assessment Through Adaptive Management. In Use and Abuse of Environmental Information in Engineering. Proceedings of the National Environmental Engineering Conference, Melbourne, March 1986. Institution of Engineers, Australia, 1986.

Dutton I M. **Offshore Tourist Development on the Great Barrier Reef.** Paper presented to Panel Forum on Engineering Implications of an Australian 200 Mile Exclusive Economic Zone organised by the Institution of Engineers, Australia, Brisbane, October 1985.

Dutton I M. **The Cape Tribulation Fringing Reefs Research and Monitoring Program.** Paper presented to the Annual Meeting of the Australian Coral Reef Society, Townsville, November 1985.

Dutton I M. **Environmental Aspects of Offshore Engineering.** Proceedings of the National Workshop on Offshore Engineering, Monash University, Melbourne, May 1986.

Dutton I M, M N Peterson and G J Just. **Interpreting the Great Barrier Reef : The Future Role of the Great Barrier Reef Wonderland.** Leisure, Lifestyles and Australian Communities : 58th National Conference, Royal Australian Institute of Parks and Recreation. Toowoomba, RAIPR, 1985.

Dutton I M, L P Zann and A Elliott. **Management of Giant Clam Mariculture Operations in the Great Barrier Reef Region.** Poster paper presented to the Annual Conference of the Australian Marine Science Association (AMSA), Hobart, February 1986.

Gilmour A and W Craik. **A Framework for Monitoring the Great Barrier Reef Marine Park.** Proceedings of the Fifth International Coral Reef Congress, Tahiti, 27 May — 1 June 1985. Moorea, Antenne Museum-Ephe, 1985.

Jupp D L B*, K K Mayo*, D A Kuchler*, D van R Claasen, R A Kenchington and P Guerin*. **Remote Sensing for Planning and Managing the Great Barrier Reef of Australia.** *Photogrammetria*. 40 : 21-42, 1985.

Kahn T P and M N Peterson. Marine Resource Management: some Teaching Strategies derived from the Great Barrier Reef Marine Park. Paper presented to the 10th National Conference of the Australian Geography Teachers Association, Brisbane, January 1986.

Kelleher G. **The Great Barrier Reef Marine Park.** Marine Parks and Conservation: Challenge and Promise. J Lien, R Graham (Eds). National and Provincial Parks Association of Canada, 1985.

Kelleher G. **The GBR: An Exercise in Joint Administration.** *Heritage Newsletter.* 8(2) : 4-5, 1985.

Kelleher G. **Federal-State-Local Government Collaboration: the Great Barrier Reef.** Paper for Coastal Zone Management Workshop, School of Applied Science, Canberra College of Advanced Education, October 1985.

Kelleher G. **Can Engineers sustain Development?** Keynote address to the 1986 National Environmental Engineering Conference, Melbourne, March 1986. Institution of Engineers, Australia, 1986.

Kelleher G. Engineering and the Environment: Does Good Engineering require Environmental Awareness? Keynote address to the Environmental Awareness Course, NSW Institute of Technology, March 1986.

Kelleher G. Australia's Great Barrier Reef Marine Park: a Conservation Strategy in Action. Paper presented to the Conference in Conservation and Development: Implementing the World Conservation Strategy, Ottawa, Canada, May-June 1986.

Kelleher G. **Global Prospects for Marine Protected Areas.** Keynote address to the International Marine Protected Area Management Seminar, San Francisco, June 1986.

Kelleher G. **Research for Management of the Great Barrier Reef.** Paper for the International Marine Protected Area Management Seminar, San Francisco, June 1986.

Kelleher G. Managing the Great Barrier Reef. Oceanus. 29(2): 13-19, 1986.

Kelleher G and I M Dutton. Environmental Effects of Offshore Tourist Developments on the Great Barrier Reef. Proceedings of the Fifth International Coral Reef Congress, Tahiti, 27 May-1 June 1985. Moorea, Antenne Museum-Ephe, 1985.

Kelleher G and K Stark*. **Planning for People on Estuaries, in Rainforests and on the Great Barrier Reef.** Paper presented to the 1986 Engineering Conference, 'Engineers as Managers', Adelaide, April 1986. Institution of Engineers, Australia. National Conference Publication No. 86/1.

Kenchington R. Coral-Reef Ecosystems: a Sustainable Resource. Nature and Resources. 21(2) : 18-27, 1985.

Kenchington R. Planning for Multiple Use of Marine Resources: the Great Barrier Reef Marine Park Approach. *Maritime Studies*. (25) : 11-14, 1985.

Kenchington R A and D van R Claasen. **A Regional Planning Approach to Marine Resource Management: the Great Barrier Reef Marine Park, Australia.** Paper presented to the International Marine Protected Area Management Seminar, Miami, Florida, NOAA, June 1986.

Kinsey D W. **The Functional Role of Lagoonal Systems in the Central Great Barrier Reef.** Proceedings of the Fifth International Coral Reef Congress, Tahiti, 27 May-1 June 1985. Moorea, Antenne Museum-Ephe, 1985.

Kinsey D W. **Metabolism, Calcification and Carbon Production** (plenary review). Proceedings of the Fifth International Coral Reef Congress, Tahiti, 27 May-1 June 1985. Moorea, Antenne Museum-Ephe, 1985.

Kinsey D W. **Offshore Tourist Developments in the Great Barrier Reef Region.** Proceedings PACON 86: Pacific Congress on Marine Technology, Honolulu, March 1986. Marine Technological Society, 1986. Section MRM9 : 1-4.

Kinsey D W. Water Quality and the Maintenance of Coral Reef Environments. Paper presented to meeting of the Australian Water and Wastewater Association, Brisbane, February 1986.

Staff Papers 71

Kinsey D W. Ocean Processes in the Understanding and Effective Management of Coral Reefs. Plenary paper presented to the Annual Conference of AMSA, Hobart, February 1986.

Speirs R A. **Park Management Planning in the Great Barrier Reef Marine Park Authority.** Leisure, Lifestyles and Australian Communities : 58th National Conference, Royal Australian Institute of Parks and Recreation. Toowoomba, RAIPR, 1985.

Woodley S J. **The Great Barrier Reef Marine Park: The Management Challenge.** Proceedings of the Fifth International Coral Reef Congress, Tahiti, 27 May—1 June 1985. Moorea, Antenne Museum-Ephe, 1985.

Woodley S J. **Management of the Great Barrier Reef Marine Park.** In Australia's Offshore Maritime Interests. Australian Centre for Maritime Studies, Canberra, 1985. *Occasional Papers in Maritime Affairs*. 3 : 111-120.

Zann L P. **A Review of Macrosymbioses in the Coral Reef Ecosystem.** In Parasitology — Quo Vadit ? Proceedings of the Sixth International Congress on Parasitology, M J Powell, (Ed). Canberra, Australian Academy of Science, 1986.

Zann L P and L Bolton*. **The Distribution, Abundance and Ecology of the Blue Coral Heliopora coerulea (Pallas) in the Pacific.** *Coral Reefs.* 4(2) : 125-134, 1985.

APPENDIX D RESEARCH IN PROGRESS 1985—86

OCFANOGRAPHY

2. * Drift Card Study of Great Barrier Reef **Surface Currents**

119. Circulation and Sediment Movement on and around North Queensland Bayhead Fringing Reefs PERIOD: January 1983-August 1986

PROJECT LEADERS: Assoc Prof D. Hopley (Sir George Fisher Centre for Tropical

Marine Studies, James Cook University) Mr K. Parnell

GBRMPA OFFICER: Mr I. Dutton

SUPPORT: GBRMPA - \$15 440

Qld Co-ordinator General — \$4 861

OBJECTIVES: To produce a model of bay dynamics, with applications to existing and possible resort sites, indicating the likely effects of development, with special emphasis on effluent disposal and changing water quality.

MANAGEMENT IMPLICATIONS: Further resort development in North Queensland is likely to take place in high island bayhead situations. Problems related to effluent disposal may occur. The study will indicate effects of different strategies and suggest possible solutions, providing a means of decision-making with limited field investigation at a variety of present and future resort sites.

METHODOLOGY: Field measurement and sampling; laboratory analysis of sediments.

STATUS: Final report to GBRMPA due August 1986.

LOCALITY: Central Section - Orpheus Island, other resort islands

150. Flow Modelling in the Central Great Barrier Reef Region - A Collaborative Research Project

PERIOD: January 1984-June 1987

PROJECT LEADERS: Dr J.C. Andrews (Australian Institute of Marine Science) Dr L. Bode (Civil and Systems Engineering, James Cook University) GBRMPA OFFICER: Dr W. Craik

SUPPORT: GBRMPA - \$136 000

OBJECTIVES: To construct and validate numerical models of flows on the Queensland continental shelf and slope in the Central Great Barrier Reef Region. To use the models to understand fluid dynamics, advection and dispersion (oil, nutrients, larvae, etc). To use the models for prediction.

MANAGEMENT IMPLICATIONS: A 1983 expert review on knowledge of the physical oceanography of the Great Barrier Reef Region listed important questions remaining unanswered. This project should answer some of these questions concerning oceanographic events and provide a model to predict these events.

METHODOLOGY: Field measurement of relevant parameters, data analysis and model construction.

STATUS: Analysis of tidal data collected by Australian Institute of Marine Science is continuing. Papers being published.

LOCALITY: Central Section

191. Installation of Tide Gauges: Collaborative Research

PERIOD: January 1985-January 1995

PROJECT LEADERS: Dr J.C. Andrews (Australian Institute of Marine Science)

Dr. L. Bode (Civil and Systems Engineering, James Cook University)

Mr T. Savory (Bureau of Meteorology)

GBRMPA OFFICERS: Dr W. Craik,

Mr I. Dutton

SUPPORT: GBRMPA — \$42 432

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

MANAGEMENT IMPLICATIONS: This project supports the Flow Modelling project (150) and will provide simultaneous tidal data through the Great Barrier Reef Region and Western Pacific.

METHODOLOGY: Installation and monitoring of tide gauges in collaboration with

* Project number and title only are listed for projects which were included in the 1984-85 Annual Report and which were completed during the current financial year.

Australian Institute of Marine Science and Bureau of Meteorology.

STATUS: Two further tide gauges purchased and installed.

LOCALITY: Great Barrier Reef Region

229. Establishment of Remote Weather Stations on the Great Barrier Reef

PERIOD: January 1986-December 1986 PROJECT LEADER: Dr J.C. Andrews (Australian Institute of Marine Science)

GBRMPA OFFICER: Dr W. Craik SUPPORT: GBRMPA — \$13 500

OBJECTIVES: To provide long-term accurate real time weather records for both research and public use.

MANAGEMENT IMPLICATIONS: A long-term series of accurate weather data is very important for studies in regional and global weather behaviour. The data collected will be archived for future generations of researchers.

METHODOLOGY: Installation of weather stations in collaboration with Australian Institute of Marine Science and Townsville Motor Boat Club to provide real-time weather reports for public and scientific use.

STATUS: Project commenced. Stations to be installed in July 1986.

LOCALITY: Central Section

230. Influence of Coral Reefs on Wave Attenuation and Circulation

PERIOD: June 1986-December 1986 PROJECT LEADER: Dr I. Young (RMC Duntroon)

GBRMPA OFFICER: Ms C. Dalliston SUPPORT: GBRMPA - \$3 200

OBJECTIVES: To determine the mechanism of wave attenuation by coral reefs, develop wave prediction techniques and determine the effectiveness of the reef as a water circulation barrier.

MANAGEMENT IMPLICATIONS: The current lack of data in this field, for the Great Barrier Reef Region, means that any wave predictions for the region must be treated with scep-ticism. This void has serious implications due to the recent increase in the number of proposed reef structures for tourist purposes.

METHODOLOGY: Deployment of an array of wave and current measurement instruments across the reef and subsequent detailed analysis of an extensive set of data.

STATUS: Analysis of data tapes commenced.

LOCALITY: Cairns Section - Carter Reef/ Lizard Island

231. Vertical and Cross-shelf Velocity

Structure of the Tides of the Central Great **Barrier Reef**

PERIOD: 1986

PROJECT LEADER: Mr C. Steinberg (Earth Sciences, Flinders University)

SUPERVISORS: Prof G.W. Lennon (Flinders University) Dr J.C. Andrews (Australian Institute of Marine Science)

GBRMPA OFFICER: Ms C. Dalliston

SUPPORT: GBRMPA Augmentative Research Grant - \$875

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OBJECTIVES: To measure the change of amplitude and phase of constituent tidal ellipses with depth, in the central Great Barrier Reef on a transect from shallow nearshore waters, through the reef zone to the shelf break. To define the essential physics to be included in the joint AIMS/JCU/GBRMPA numerical tidal model of the region.

MANAGEMENT IMPLICATIONS: This project supports the Flow Modelling project (150). The results should allow prediction of the paths of biota, nutrients and contaminants that travel at different depths in the water column.

METHODOLOGY: Field measurement and subsequent data analysis.

STATUS: Analysis of data has commenced.

LOCALITY: Great Barrier Reef Region

MARINE GEOSCIENCES

151. Biologic Reef Destruction - Products, **Rates and Causes**

PERIOD: October 1983-April 1987 PROJECT LEADERS: Dr P.A. Hutchings (Australian Museum)

Dr P.J. Davies (Bureau of Mineral Resources) Mr W. Kiene (Geology, Australian National University)

GBRMPA Officer: Ms E. Eager SUPPORT: GBRMPA — \$45 149

OBJECTIVES: To determine the principal bioeroders and mechanisms of erosion on reef fronts, reef flats and in lagoons of juvenile, mature, and senile reefs. To determine whether the products and processes of bioerosion are related to evolutionary stages of reef growth.

MANAGEMENT IMPLICATIONS: Bioerosion is a destructive force on reefs. Natural rates of bioerosion need to be determined before man's impact can be assessed.

METHODOLOGY: Field survey, sampling and experiments using substrate blocks. Laboratory analysis of substrates.

STATUS: Experiments established February 1984; substrate collections started September 1984. Final report to GBRMPA due April 1987.

LOCALITY: Capricornia Section, Cairns Section

152. Coastal Processes Forming and Maintaining the Coral Cays of the Great Barrier Reef and their Implications for Marine Park Management

PERIOD: November 1983-August 1986 PROJECT LEADER: Dr M. Gourlay (Civil Engineering, University of Queensland) GBRMPA OFFICER: Dr W. Craik SUPPORT: GBRMPA - \$5 000

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

MANAGEMENT IMPLICATIONS: This project is designed to provide information on the effects of dredged channels, groynes, seawalls, etc.; guidelines on widths of buffer zones for buildings, maximum area of cay for

development, locations of effluent discharges, etc.; and possibilities of catastrophic destruction of cays.

METHODOLOGY: Intensive library research and field verification.

STATUS: Draft report received.

LOCALITY: Great Barrier Reef Region

153. Stratigraphy of Lagoon Sediments and Reef Margins — Lady Musgrave Island PERIOD: May 1984-June 1986

PROJECT LEADER: Assoc Prof C.V.G. Phipps (Geology and Geophysics, University of Sydney

GBRMPA OFFICER: Mr I. Dutton SUPPORT: GBRMPA — \$3 000

OBJECTIVES: To relate reef flat stratigraphy and development to lagoonal stratigraphy. To define sedimentation rates in the lagoon and to expand upon existing understanding of sedimentation patterns and processes. Supplementary analysis of freshwater wedge under Lady Musgrave Island.

MANAGEMENT IMPLICATIONS: This project should improve understanding of lagoonal sediment variations and thus whether patterns and processes of erosion or sedimentation at Lady Musgrave Island have been affected by human activities.

METHODOLOGY: Field survey and sampling using vibrocores, boomer lines and shallow drilling.

STATUS: Final report due.

LOCALITY: Capricornia Section — Lady Musgrave Island

154. * Stability of Coral Cays in the Capricornia Section of the Great Barrier Reef **Marine Park**

155. Role of Acanthaster planci in Reef Degradational Processes — a Preliminary Study

PERIOD: May 1984-September 1986 PROJECT LEADER: Assoc Prof R. Henderson (Geology, James Cook University) GBRMPA OFFICER: Mr I. Dutton

SUPPORT: GBRMPA — \$3 040

OBJECTIVES: To produce an atlas documenting the morphology of A. planci skeletal elements.

MANAGEMENT IMPLICATIONS: This project will contribute to understanding of A. planci in terms of long term dynamics, and the degree of threat which A. planci infestations may pose to reef stability.

METHODOLOGY: Examination of skeletal components of A. planci using a Scanning Electron Microscope.

STATUS: Report accepted and publication of atlas in process.

LOCALITY: Cairns Section - Green Island Reef, Central Section — John Brewer Reef

156. Modern Sediment Dispersal at the **Burdekin River Mouth**

PERIOD: May 1984-December 1986 PROJECT LEADER: Prof R.M. Carter (Geology, James Cook University)

GBRMPA OFFICER: Mr I. Dutton SUPPORT: GBRMPA - \$3 330

OBJECTIVES: To undertake a pilot study to investigate the patterns of sediment distribution and dispersal onto the river shelf at the Burdekin River mouth, with respect to: (i) locations of maximum sediment accumulation over the past 6,500 years; (ii) volumetric estimate of the shelf sediment wedge; (iii) establishing the seawards extent of the wedge; and (iv) establishing a sedimentary baseline.

MANAGEMENT IMPLICATIONS: The Burdekin is the largest single supplier of sediment in the Great Barrier Reef Region. This project will provide a basis for determining effects of the Burdekin Dam on the Great Barrier Reef.

METHODOLOGY: Standard techniques of low frequency seismic profiling, grab sampling, coring and laboratory analyses.

STATUS: Report due December 1986.

LOCALITY: Central Section — Burdekin River mouth

192. * Initial Site Survey of Cape Tribulation **Coast Fringing Reef**

193. Sedimentary Setting of Fringing Reef at **Donovan Point**

PERIOD: May 1985-August 1986

PROJECT LEÁDER: Dr D. Johnson (Geology, James Cook University)

GBRMPA OFFICER: Mr I. Dutton

SUPPORT: GBRMPA - \$5 470

OBJECTIVES: To determine geological sediment facies. To delineate shallow stratigraphy of peri-reef sediments.

MANAGEMENT IMPLICATIONS: Baseline data on sedimentary patterns and fringing reef growth will be gained.

METHODOLOGY: Field survey and collection of core samples for radiocarbon dating.

STATUS: Interim report received.

LOCALITY: Cairns Section

194. * Sediment Field of the North **Queensland Coast**

195. Terrigenous Sedimentation and Change on Low Isles since 1929

PERIOD: 1985

PROJECT LEADER: Ms C. Rasmussen

(Geography, James Cook University) SUPERVISOR: Assoc Prof D. Hopley

GBRMPA OFFICER: Ms E. Eager

SUPPORT: GBRMPA Augmentative Research Grant - \$700

OBJECTIVES: To determine the accuracy of reports of increased sedimentation from the land and deterioration of reef flat communities since the first Royal Society Expedition in 1929.

MANAGEMENT IMPLICATIONS: Information on the effects of mainland activities on nearshore reefs and the effects of increased tourist activity should be gained.

METHODOLOGY: Field survey and collection of samples for laboratory analysis.

STATUS: Field work completed. Report in preparation.

LOCALITY: Cairns Section — Low Isles

196. Past, Present and Future Changes in the Cairns Urban Coastline

PERIOD: 1985

PROJECT LEADER: Ms J. Spriggs (Geography, James Cook University)

SUPERVISOR: Assoc Prof D. Hopley

GBRMPA OFFICER: Ms E. Eager

SUPPORT: GBRMPA Augmentative Research Grant — \$825

OBJECTIVES: To analyse long—term physical coastal changes along the Cairns urban coastline from the time of first settlement. To locate sites with most rapid changes and investigate possible causes. To study current management policies.

232. Coral Recruitment on Fringing Reefs near Cape Tribulation

PERIOD: December 1985-September 1988 PROJECT LEADERS: Dr V. Harriott, Mr D. Fisk (Reef Research and Information Services) GBRMPA OFFICER: Mr I. Dutton SUPPORT: GBRMPA — \$15 300

OBJECTIVES: To determine coral recruitment patterns in the vicinity of Cape Tribulation. To assess whether sediment runoff from Cape Tribulation road has affected recruitment.

MANAGEMENT IMPLICATIONS: This project will provide data on the susceptibility of fringing reefs to sediment, especially that caused by human interference in neighbouring terrestrial systems.

METHODOLOGY: Assessment will be made of the composition of spat recruitment on the settlement plates at sites adjacent to the Cape Tribulation road.

STATUS: Monitoring of the settlement plates has commenced.

LOCALITY: Coastline adjacent to Cairns Section

233. Monitoring of Cape Tribulation Fringing Reefs

PERIOD: December 1985-September 1988 PROJECT LEADER: Dr A. Ayling (Sea Research)

GBRMPA OFFICER: Mr I. Dutton SUPPORT: GBRMPA — \$88 500

OBJECTIVES: To determine and monitor biological patterns and processes in the vicinity of Cape Tribulation. To assess whether sediment runoff from the Cape Tribulation road has affected these patterns.

MANAGEMENT IMPLICATIONS: This project will provide data on the susceptibility of fringing reefs to sediment, especially that caused by human interference in neighbouring terrestrial systems.

METHODOLOGY: Survey by line transect of fringing reefs adjacent to both established and newly—constructed sections of the road.

STATUS: Two wet seasons monitored.

LOCALITY: Coastline adjacent to Cairns Section

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234. Effects of Disturbed Rainforest Catchments on Adjacent Fringing Reefs — Cape Tribulation

PERIOD: September 1985-December 1988 PROJECT LEADERS: Assoc Prof D. Hopley, Mr D. Hoyal and Mr B. Partain (James Cook University)

GBRMPA OFFICER: Mr I. Dutton

SUPPORT: GBRMPA — \$38 460

— Augmentative Research Grants — 2x\$750

OBJECTIVES: To evaluate the impact of cleared rainforest catchment on fringing reefs in the Cape Tribulation area.

MANAGEMENT IMPLICATIONS: This project will be used to outline the effects upon fringing reefs of the increased input of terrigenous sediment due to human impact.

METHODOLOGY: Sampling by removal of cores from reefs, by use of sediment traps and by aerial survey.

STATUS: Field work underway. Cores taken. Sediment traps and stage samplers installed.

LOCALITY: Coastline adjacent to Cairns Section

MANAGEMENT IMPLICATIONS: Coastal changes resulting in alterations to sediment levels may adversely affect coral reefs close to the mainland.

METHODOLOGY: Study of maps, photographs and other written records in Brisbane and Cairns.

STATUS: Field work continuing.

LOCALITY: Coastline adjacent to Cairns Section

235. Townsville's Urban Coastline — Past, Present and Future Changes

PERIOD: 1986 PROJECT LEADER: Ms J. Spriggs (Geography, James Cook University)

SUPERVISORS: Assoc Prof D. Hopley

GBRMPA OFFICER: Ms C. Dalliston

SUPPORT: GBRMPA Augmentative Research Grant — \$900

OBJECTIVES: To analyse long-term physical changes along the Townsville urban coastline from the time of first settlement. To determine areas with most rapid changes and investigate possible causes. To study current management policies.

MANAGEMENT IMPLICATIONS: Coastal changes resulting in alterations to sediment levels and movements may adversely affect coral reefs and other marine resources close to the mainland.

METHODOLOGY: Literature search of Local and State Government records. Study of maps and photographs in Brisbane and Townsville.

STATUS: Project underway.

LOCALITY: Coastline adjacent to Central Section

MARINE CHEMISTRY

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

PERIOD: 1984 and 1985

PROJECT LEADERS: Chemistry students (Capricornia Institute of Advanced Education) SUPERVISORS: Dr G. Pegg, Dr J. Hughes GBRMPA OFFICER: Ms E. Eager

SUPPORT: Qld Co-ordinator General \$900

GBRMPA Augmentative Research Grant -\$630

Q.NPWS — logistic support

OBJECTIVES: To determine important physical and chemical properties of cay soils and to relate these findings to parameters such as location, depth, human usage (particularly camping), flora and fauna populations and possibly effluent disposal.

MANAGEMENT IMPLICATIONS: Information for planning island use should result.

METHODOLOGY: Collection and analysis of soil samples.

STATUS: Progress report received. Field work continuing.

LOCALITY: Capricornia Section — Heron Island, Tryon Island, North West Island

197.* Organochlorine Pesticide Levels in Selected Sediments of the Great Barrier Reef **PERIOD: 1986**

PROJECT LEADER: Mr N. Waldron (Australian Environmental Studies, Griffith University)

SUPERVISOR: Dr D.W. Connell

GBRMPA OFFICER: Ms C Dalliston

SUPPORT: GBRIMPA Augmentative Research Grant - \$650

OBJECTIVES: To collect birds of different trophic classes in the Capricornia Section of the Reef. To isolate, identify and quantify any chlorinated hydrocarbons present. To relate the presence of any chlorinated hydrocarbons to possible sources, physicochemical properties of the compounds, trophic class and possible detrimental effects.

MANAGEMENT IMPLICATIONS: Trace organic compounds are known to interfere with breeding success in a wide variety of birds. This project should provide information to enable monitoring of levels of these compounds.

METHODOLOGY: Isolation, identification and guantification of chlorinated hydrocarbons. Data analysis and comparison of results with scientific literature.

STATUS: Project underway.

LOCALITY: Capricornia Section - Heron Island.

236. Particulate Matter as an Indicator of Terrigenous and Anthropogenic Inputs to Corals of the Great Barrier Reef **PERIOD: 1986**

PROJECT LEADER: Mr B. Currie (Organic Chemistry, University of Melbourne) SUPERVISOR: Dr R.B. Johns

GBRMPA OFFICER: Ms C. Dalliston

SUPPORT: GBRMPA Augmentative Research Grant - \$1000

OBJECTIVES: To determine the likely nature of the input sources to the particulate matter in marine waters around fringing reefs.

MANAGEMENT IMPLICATIONS: The recognition of terrestrial input to particulate matter is important for (i) the management of coastal land use and (ii) an understanding of food chain studies on coral reefs.

METHODOLOGY: Collection, fractionation and analysis of particulate matter.

STATUS: Project underway.

LOCALITY: Cairns Section

282. Investigation of the Presence of Chlorinated Hydrocarbon Residues in Great **Barrier Reef Birds**

PERIOD: 1986 LEADER: Mr N. Waldron PROIECT (Australian Environmental Studies. Griffith University)

SUPERVISOR: Dr D.W. Connell

GBRMPA OFFICER: Ms C Dalliston

SUPPORT: GBRMPA Augmentative Research Grant - \$650

OBJECTIVES: To collect birds of different trophic classes in the Capricornia Section of the Reef. To isolate, identify and quantify any chlorinated hydrocarbons present. To relate presence of any chlorinated the possible hydrocarbons sources, to physicochemical properties of the compounds, trophic class and possible detrimental effects.

MANAGEMENT IMPLICATIONS: Trace organic compounds are known to interfere with breeding success in a wide variety of birds. This project should provide information to enable monitoring of levels of these compounds.

METHODOLOGY: Isolation, identification and quantification of chlorinated hydro-carbons. Data analysis and comparison of results with scientific literature.

STATUS: Project underway.

LOCALITY: Capricornia Section - Heron Island

BATHYMETRY AND SURVEY

198. Spectrographic Analysis of Reef Features PERIOD: January 1985 — December 1986

PROIECT LEADERS: Dr D. Jupp (CSIRO, Division of Water and Land Resources) Dr D. Kuchler (CSIRO, Davies Laboratories) GBRMPA OFFICER: Mr D. Claasen

SUPPORT: GBRMPA — \$36 000;

MSTGS — \$55 700

OBJECTIVES: To obtain field spectral measurements and develop an understanding of spectral signatures of reef and water features. MANAGEMENT IMPLICATIONS: The development of a capacity to delineate reef and water features will greatly increase the utility of remote sensing for the Great Barrier Reef.

METHODOLOGY: Analysis of data from satellites and airborne scanners. Comparison with field spectral measurements and observations.

STATUS: Project underway.

LOCALITY: Great Barrier Reef Region

MARINE BIOLOGY

54. * Systematics and Ecology of the Phytobenthos of the Swain Reefs

64. Biology and Management of Trochus PERIOD: June 1981 — August 1986 PROJECT LEADERS: Mr R. Pearson Mr W. Nash (Fisheries Research, Qld Department of Primary Industries) GBRMPA OFFICER: Dr W. Craik SUPPORT: GBRMPA — \$38 151; Q.DPI - \$35 000

OBJECTIVES: 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.

MANAGEMENT IMPLICATIONS: Considerable interest has been expressed by commercial fishermen in collecting trochus in the Great Barrier Reef Region. Present biological understanding is minimal and totally inadequate for determining the impact, sustainable harvest or reasonable extent of such a fishery. METHODOLOGY: Field survey and laboratory studies.

STATUS: Final report received and reviewed.

LOCALITY: Cairns Section, Central Section

121. An Illustrated Key to the Parrotfishes of the Great Barrier Reef

PERIOD: July 1982 - September 1986

PROJECT LEADER: Dr H. Choat (University of Auckland, New Zealand)

GBRMPA OFFICER: Dr W. Craik SUPPORT: GBRMPA — \$9 900

MSTGS - \$6 645

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

MANAGEMENT IMPLICATIONS: This project will provide assistance to scientists, reef users and educationalists, etc. on identifying and separating what is probably the most difficult group of fishes to identify in the Great Barrier Řeef.

METHODOLOGY: Field collecting and photography, museum work, publication.

STATUS: Manuscript prepared. Publication by Australian Museum anticipated.

LOCALITY: Great Barrier Reef Region

123.* Survey of Seabird Colonies of the Capricornia Section of the Great Barrier Reef **Marine Park**

124. The Effects of Fuel Oil, Oil Emulsifier and Lower Salinity upon the Common Indo-Pacific Reef Coral Acropora formosa PERIOD: June 1983 — August 1986

PROJECT LEADERS: Mr P. Harrison, Dr C.G. Alexander, Dr J.D. Collins (Sir George Fisher Centre for Tropical Marine Studies, and School of Biological Sciences, James Cook University)

78 Appendixes

GBRMPA OFFICER: Ms E. Eager SUPPORT: GBRMPA — \$2 784

OBJECTIVES: To determine the effects of oil emulsifier, oil plus emulsifier and lowered salinity on Acropora formosa.

MANAGEMENT IMPLICATIONS: Oil spills, use of oil emulsifier and lowered salinity (increased runoff) may occur in the Great Barrier Reef Region. Laboratory information on reactions of A. formosa to such stresses will assist in predicting effects of oil spills, effects of cleanup and effects of increased runoff.

METHODOLOGY: Laboratory experiment and examination of effects at morphological, histological and ultra-structural levels.

STATUS: Draft final report received.

LOCALITY: Great Barrier Reef Region

137.* Microbial Ecology of the Staghorn Coral (Acropora)

138.* Abundance, Schooling Behaviour and **Population Dynamics of Silversides**

(Atherinidae) and Sprats (Clupeidae)

142.* The Algal Bearing Ascidians of the **Great Barrier Reef**

143. An Investigation into the Relationship between Breeding and Feeding of Seabirds around Reef Environments

PERIOD: 1983, 1985 and 1986

PROJECT LEADER: Mr G. Smith (Australian Environmental Studies, Griffith University)

SUPERVISORS: Dr C. Ćatterall, Dr K. Hulsman GBRMPA OFFICERS: Dr W. Craik,

Ms E. Eager

SUPPORT: GBRMPA Augmentative Research Grants — \$2800

OBJECTIVES: To test if food is a limiting resource to reproductive output and chick growth of tropical seabirds. To test if weather, tides, inter-specific competition and prey availability affect consumption.

MANAGEMENT IMPLICATIONS: The viability of seabirds may be affected by food supplies (overfishing), and/or pollution effects. This study should provide information for fish management decisions on boundaries related to management of bird populations.

METHODOLOGY: Field surveys, observation and experiments.

STATUS: Two annual reports received. Field work continuing.

LOCALITY: Cairns Section - Lizard Island area

146, 224. Evaluation of Biological and

Economic Aspects of Coral Collecting in the **Great Barrier Reef Region**

PERIOD: June 1983 — August 1986

PROJECT LEADERS: Dr J.T. Baker, Assoc Prof M. Pichon, Mr J. Oliver (Sir George Fisher Centre for Tropical Marine Studies and Department of Marine Biology, James Cook University)

GBRMPA OFFICERS: Dr W. Craik,

Mr P. McGinnity

SUPPORT: GBRMPA — \$81 700;

\$887 (Sudbury Reef Coral Assessment)

OBJECTIVES: To investigate aspects of the biology of principal commercial coral species of the Great Barrier Reef from the view of management. To determine rates of production (supply) and collection to provide guidelines for harvesting and management.

MANAGEMENT IMPLICATIONS: Enforcement of the ban on Philippine exports was anticipated to create pressure on Australian corals. There is an urgent need for management guidelines, e.g. best form of lease, quantities to be harvested, regrowth rates etc. to be determined.

METHODOLOGY: Field survey, observation and measurement; laboratory studies; survey of coral collectors. Associated assessment of coral cover on Sudbury Reef, a reef on which a large percentage of commercial coral collection occurs.

STATUS: Report accepted. Management implications being evaluated.

LOCALITY: Great Barrier Reef Region

163, 225. Methods for the Re-establishment of Hard Corals in Denuded Reef Systems PERIOD: August 1983 — June 1987

165. Coral Reef Metabolism and Calcification PERIOD: September 1983 — September 1986 PROJECT LEADERS: Assoc Prof M. Pichon, Dr J. Morrissey (Marine Biology, James Cook University)

GBRMPA ÖFFICER: Dr W. Craik SUPPORT: GBRMPA — \$1 800; JCU Special Grant 1983 — \$2 000

OBJECTIVES: 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.

MANAGEMENT IMPLICATIONS: Organic production and rates of calcification are parameters which best provide accurate information on the state of health of a given reef and therefore are of direct relevance to the planning and management of the Marine Park.

METHODOLOGY: Field measurement and laboratory analysis of seawater samples.

STATUS: Awaiting final report.

LOCALITY: Central Section

166. Provision of Demographic Data and Recommendations for Management Guidelines for the Collection of Aquarium Fish in the Great Barrier Reef Marine Park PERIOD: August 1983 — August 1986 PROJECT LEADER: Assoc Prof P. Sale (Biological Sciences, University of Sydney) GBRMPA OFFICER: Dr W. Craik SUPPORT: GBRMPA — \$41 302

OBJECTIVES: To collect demographic data on six species (including families Chaetodontidae, Pomacentridae and Labridae) to permit the development of size-age relationships useful for monitoring populations and to permit the assessment of turnover rate in the One Tree Island Reef populations. To investigate temporal variation in standing stock and rate of recruitment. To study social organisation, habitat requirements and mobility of adults of each species.

MANAGEMENT IMPLICATIONS: This project will provide firm demographic data on six representative species of interest to the aquarium trade. The techniques developed for determining such data will be available for subsequent application to other species.

METHODOLOGY: Field and laboratory studies; small manipulative field experiments.

STATUS: Awaiting final report.

LOCALITY: Capricornia Section — One Tree Island Reef

MANAGEMENT IMPLICATIONS: More information on reef fish movements and growth will be useful for management particularly for interpreting the results of surveys investigating the effects of Replenishment Areas.

METHODOLOGY: Computer analysis of data records from fish tagging program using the Statistical Package for Social Sciences (SPSS) and ELEFAN programs developed by the International Centre for Living Aquatic Resource Management (ICLARM) in the Philippines.

STATUS: Awaiting final report.

LOCALITY: Capricornia Section

168.* Reproductive Ecology of Eight Staghorn Coral (Acropora) Species

169. Monitoring Crown of Thorns Starfish PERIOD: Ongoing since 1981.

PROJECT LEADER: Dr L. Zann (GBRMPA) GBRMPA OFFICER: Dr L. Zann SUPPORT: GBRMPA staff and facilities

OBJECTIVES: To monitor the situation with regard to (i) the spread of crown of thorns starfish throughout the Great Barrier Reef Region and (ii) the intensity of crown of thorns starfish predation of reefs throughout the Great Barrier Reef Region. To provide an historical database of (i) and (ii) above.

MANAGEMENT IMPLICATIONS: The reason for an apparent upsurge in crown of thorns starfish populations since the early 1960s is still not understood (i.e. man induced or natural). Therefore, the role of the Authority in monitoring the crown of thorns starfish will continue until reasons for population increases are established or populations decline into insignificance.

METHODOLOGY: Reef users are provided with crown of thorns sighting forms which they complete for individual reefs visited.

STATUS: Replies have been entered onto a computerised database which is updated regularly.

LOCALITY: Great Barrier Reef Region

174.* Juvenile Fish Nursery Areas: Pilot Study on By-catch of Trawlers

177. Analysis of Fish Tagging Data

PERIOD: June 1984 — December 1986. PROJECT LEADER: Mr R. Giddins (consultant) GBRMPA OFFICER: Ms E. Eager SUPPORT: GBRMPA — \$2 750

OBJECTIVES: To analyse length-frequency data on reef fishes, information on breeding areas and effects of fishing conditions on catch. To analyse the data using the ELEFAN programs for prediction of growth parameters.

PROJECT LEADER: Dr V. Harriott (Sir George Fisher Centre for Tropical Marine Studies and Department of Marine Biology, James Cook University)

GBRMPA OFFICERS: Dr W. Craik, Dr L. Zann SUPPORT: GBRMPA — \$9 940 (Phase I); \$78 500 (Phase II)

OBJECTIVES: To compile, from available knowledge, a set of procedures for the reestablishment 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.

MANAGEMENT IMPLICATIONS: This project should produce a handbook which will identify causes of reef deterioration likely to be encountered in recreationally and commercially important areas, and in particular which will outline methods for re-establishing coral communities in the different environments.

METHODOLOGY: Preparation, after appropriate research review and consultation, of a draft handbook (Phase I). Field experiments and observation to test methods proposed in handbook. Revision of handbook (Phase II).

STATUS: Phase I completed. Progress reports of field tests received.

LOCALITY: Cairns Section

180.* Hereditary Structure and Genetic Exchange in Coral Populations

181. Detrital Fluxes of Carbon and Nitrogen on a Coral Reef

PERIOD: 1984 and 1985

PROJECT LEADER: Mr R. Johnstone

(Biological Sciences, University of Sydney)

SUPERVISOR: Assoc Prof A. Larkum

GBRMPA OFFICER: Ms E. Eager

SUPPORT: GBRMPA Augmentative Research Grants — \$1600

OBJECTIVES: To investigate factors determining bacterial distribution and examine aspects of bacterial metabolism related to carbon and nitrogen flow through coral sediments. (Comparisons to be made between healthy and stressed reefs.)

MANAGEMENT IMPLICATIONS: This study will increase understanding of the role of microbes in regenerating nutrients in coral reef systems with implications for management of human pollutants and wastes which often contain high levels of carbon and nitrogen and often collect as sediment.

METHODOLOGY: Field sampling and laboratory analysis of sediments.

STATUS: Awaiting final report.

LOCALITY: Capricornia Section — One Tree Island Reef, Heron Island Reef

182. Functional Morphology and Nutrition of the Dugong in Relation to its Seagrass Diet PERIOD: 1984 and 1985

80 Appendixes

PROJECT LEADER: Ms J. Lanyon (Zoology, James Cook and Monash Universities)

SUPERVISORS: Dr G.C. Sanson, Dr H. Marsh

GBRMPA OFFICER: Ms E. Eager SUPPORT: GBRMPA Augmentative Research

Grants — \$1 750

OBJECTIVES: 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.

MANAGEMENT IMPLICATIONS: A possible relationship between seagrass nutrient levels and availability, and the timing of breeding and migratory movements may have implications for planning to protect areas of seagrass important for dugong conservation.

METHODOLOGY: Field observation and sampling, laboratory analyses.

STATUS: Awaiting final report.

LOCALITY: Central Section

199. Troll Fishery Study

PERIOD: July 1984 — Áugust 1986 PROJECT LEADERS: Mr R. Pearson, Dr G. Goeden (Fisheries Research, Qld Department of Primary Industries) GBRMPA OFFICER: Dr W. Craik SUPPORT: GBRMPA — \$4 860

OBJECTIVES: To investigate pelagic versus non-pelagic fish catch by trolling at varying distances from reef edges.

MANAGEMENT IMPLICATIONS: This project has direct implications for zoning, particularly with respect to distances zones should extend from reef edges and the effectiveness of Marine National Park Buffer Zones.

METHODOLOGY: Field work on catch composition versus distance from reef edge, log books and analysis of gut contents of species caught.

STATUS: Report received and undergoing review.

LOCALITY: Cairns Section

200. Demersal Reef Fish Study

PERIOD: July 1984 — September 1986 PROJECT LEADERS: Mr R. Pearson, Dr G. Goeden (Fisheries Research, Qld Department of Primary Industries) GBRMPA OFFICER: Dr W. Craik SUPPORT: GBRMPA — \$16 000

OBJECTIVES: To produce size and growth curves of demersal reef fish using otolith dating.

MANAGEMENT IMPLICATIONS: Knowledge of life history of reef fish species is important for management.

METHODOLOGY: Microscopic examination of previously collected otoliths of at least four species of reef fish.

STATUS: Fieldwork completed. Report being prepared.

LOCALITY: Great Barrier Reef Region

201. Giant Clam Study

PERIOD: July 1984 — December 1986 PROJECT LEADERS: Mr R. Pearson (Fisheries Research, Qld Department of Primary Industries), Dr J. Munro (James Cook University and International Centre for Living Aquatic Resource Management) GBRMPA OFFICER: Mr I. Dutton SUPPORT: GBRMPA — \$9 900

OBJECTIVES: To establish population para-meters (growth, recruitment and natural mortality) for the giant clams Tridacna gigas and Tridacna derasa.

MANAGEMENT IMPLICATIONS: Information will be gained on population biology and life cycle of these species which have been illegally harvested on the Great Barrier Reef and are now the subject of commercial interest.

METHODOLOGY: Field survey and measurement of clams within a permanently marked grid on Michaelmas Cay Reef.

STATUS: Final report being prepared.

LOCALITY: Cairns Section

202. Red Spot King Prawn By-Catch Study PERIOD: July 1984 — December 1986

PROJECT LÉADERS: Mr R. Pearson, Mr C. Jones (Fisheries Research, Qld Department of Primary Industries)

GBRMPA OFFICER: Dr L. Zann

SUPPORT: GBRMPA - \$77 900

Qld Department of Primary Industries: Fishing Industry Research Trust Account — \$90,450 (for associated biology and fishery study)

OBJECTIVES: To investigate the by-catch component of the emerging red spot prawn (Penaeus longistylus) fishery.

MANAGEMENT IMPLICATIONS: Knowledge of the ecological impact of the fishery in terms of both target and non-target species is important for management.

METHODOLOGY: Regular trawls and recording details of by-catch.

STATUS: Interim report received.

LOCALITY: Central Section

203.* Evaluation of Biology, Distribution and Abundance of Dugong in the Great Barrier **Reef for Management: Pilot Study**

204. Manta Tow Handbook

PERIOD: March 1985 - May 1985 PROJECT LEADER: Mr G. Bull (consultant) GBRMPA OFFICER: Ms S. Driml SUPPORT: GBRMPA — \$3 000

OBJECTIVES: To prepare a manuscript for a handbook outlining the manta tow survey technique.

MANAGEMENT IMPLICATIONS: The handbook will be of use in training and in field surveys where it will assist standardisation of methods.

METHODOLOGY: Preparation of a manuscript, review by experts in the technique and field trial of the draft handbook.

STATUS: Manuscript complete. Publication proposed for 86-87.

LOCALITY: Great Barrier Reef Region

205, 206, 207.* Crown of Thorns Starfish **Monitoring and Experimental Control Studies** (3 projects)

208.* Coral Trout, Coral and Crown of Thorns Starfish Survey in the Central Section

209.* Reef Monitoring Methodology for Crown of Thorns Starfish

211. Pathology of Crown of Thorns Starfish PERIOD: April 1985 — June 1986 PROJECT LEADERS: Dr D.C. Sutton, Dr J. Lucas (Marine Biology, James Cook University)

GBRMPA OFFICER: Dr L. Zann SUPPORT: GBRMPA — \$2 024

212. Recensus of Reef Fish at Sumilon Reef, **Central Philippines**

PERIOD: May 1985 — August 1986

PROJECT LEADER: Dr G. Russ (Australian Institute of Marine Science) GBRMPA OFFICER: Dr W. Craik

SUPPORT: GBRMPA - \$500

OBJECTIVES: To recensus reef fish at Sumilon Reef, to determine current status of fish population. (A previously closed area of this reef was re-opened to fishing in late 1984.)

MANAGEMENT IMPLICATIONS: Replenishment Area concept in GBRMPA zoning plans is based on closing reefs to fishing to build up fish stocks and subsequently re-opening them to fishing. Sumilon survey should indicate effect of re-opening reef to fishing.

METHODOLOGY: Visual census of reef fish; evaluation of fish catch data.

STATUS: Field work completed.

LOCALITY: Sumilon Reef, Central Philippines

213. The Role of Crustose Coralline Algae in **Coral Reef Ecosystems**

PERIOD: 1985 and 1986

PROJECT LEADER: Mr J. Chisholm (Botany, James Cook University)

SUPERVISORS: Dr I. Price (Botany, James Cook University), Dr B. Chalker (Australian Institute of Marine Science)

GBRMPA OFFICER: Ms E. Eager

SUPPORT: GBRMPA Augmentative Research Grant — \$1 900

OBJECTIVES: To establish models for photosynthesis and calcification in selected species of crustose coralline algae. To use models to estimate productivity and calcification in specific assemblages of these reef-building algae.

MANAGEMENT IMPLICATIONS: Crustose coralline algae are important reef builders OBJECTIVES: To isolate bacteria associated with a disease affecting Acanthaster planci in Fiji. To characterise potentially pathogenic bacteria at the Centre for Tropical Marine Studies, James Cook University and test for ability to cause disease in in-vitro cell cultures of A. planci from the Great Barrier Reef Region.

MANAGEMENT IMPLICATIONS: This is a unique opportunity to obtain micro-organisms pathogenic to A. planci. In addition to contribution to general understanding of the biology and ecology of *A. planci*, the oc-currence of disease has implications for the development of control methods and strategies.

METHODOLOGY: Field collection of diseased and healthy specimens of A. planci from Suva barrier reef. Laboratory isolation of bacteria, purification and pathogenicity testing

STATUS: Collection completed. Testing in progress. Continuing under MSTGS/COTSAC funding.

LOCALITY: Fiji Islands and Great Barrier Reef Region

214. Analysis of Mollusc Benthic Community Structure in Capricornia Group Coral Reef Lagoon Sediments

PERIOD: 1985 and 1986

PROJECT LEADER: Mr B. Long (Zoology, University of Queensland)

SUPERVISOR: Dr T. Hailstone

GBRMPA OFFICER: Ms E. Eager

SUPPORT: GBRMPA Augmentative Research Grant - \$1800

OBJECTIVES: To investigate the degree of variability of mollusc abundance in the Heron Reef lagoon and possible causal factors.

MANAGEMENT IMPLICATIONS: Greater knowledge of the spatial and temporal variability of mollusc species will be useful for development of monitoring programs and review of zoning arrangements.

METHODOLOGY: Field survey, sampling and experiment.

STATUS: Project underway. Data on spatial variability has been analysed.

LOCALITY: Capricornia Section - Heron and Wistari Reefs, One Tree Island Reef

215. Sexual and Asexual Reproduction: An Elecrophoretic Examination of the Brood **Planulae of Scleractinian Corals**

PERIOD: 1985 and 1986

PROJECT LEADER: Ms J. Resing (Zoology, Duke University, USA; Australian Institute of Marine Science)

SUPERVISORS: Dr S. Wainwright

(Duke University)

Dr J. Stoddart (Australian Institute of Marine Science)

GBRMPA OFFICER: Ms E. Eager

SUPPORT: GBRMPA Augmentative Research Grant - \$1 900

OBJECTIVES: To determine the mode of reproduction of species of scleractinian coral which produce brooded planulae on the Great Barrier Reef. To study substratum selection by the planulae.

MANAGEMENT IMPLICATIONS: Coral species which form a large part of the reef community and some commercially collected species are included in the ten known to brood planulae. An understanding of life history strategies of individual species will allow more accurate predictions to be made about the reef system.

METHODOLOGY: Field sampling, laboratory observation and electrophoretic examination of planulae. Field and laboratory settling experiments.

STATUS: Field work underway.

LOCALITY: Cairns Section - Lizard Island Reef

216. Movements and Behaviour of Coral **Trout at Heron Island PERIOD: 1985**

PROJECT LEADER: Ms M. Samoilys (Zoology, University of Queensland)

SUPERVISORS: Dr T. Hailstone, Dr K. Warburton (Zoology, University of Queensland)

GBRMPA OFFICER: Ms E. Eager

SUPPORT: GBRMPA Augmentative Research Grant — \$1 000

OBJECTIVES: To investigate the occurrence and constancy of assemblages of coral trout and their variability in time and space.

MANAGEMENT IMPLICATIONS: Detailed knowledge of the spatial distribution and movements of coral trout can be used to suggest practices for local management of the stock of one of the most commercially important fish of the Great Barrier Reef.

METHODOLOGY: Field survey and observation of tagged fish (freeze branding to be tested).

STATUS: Thesis to be submitted August 1986.

LOCALITY: Capricornia Section - Heron Island Reef

237. Biological Basis for Managing Populations of Dugongs and Other Marine Mammals in the Great Barrier Reef Marine Park

PERIOD: July 1985 — December 1987 PROJECT LEADERS: Dr H. Marsh (Zoology,

lames Cook University) GBRMPA OFFICER: Dr W. Craik

SUPPORT: GBRMPA - \$181 200

OBJECTIVES: To co-ordinate programs which will obtain information on man induced mortality as a prerequisite to minimising the illegal and incidental killing of dugongs and to limiting the indigenous take to a sustain-able yield level. Also to advise management authorities on the development of programs to manage dugong populations.

MANAGEMENT IMPLICATIONS: Without developing management regimes to keep man-induced dugong mortality within a level compatible with dugong population main-tenance, the dugong may well be lost from the waters of the Great Barrier Reef.

METHODOLOGY: Aerial surveys, satellite tagging, aerial photogrammetry, specimen collection and incidental sightings.

STATUS: Project underway. Interim report received.

LOCALITY: Great Barrier Reef Region

238. Monitoring and Mapping of Coral Spawn Slicks Using Remote Sensing Techniques (Pilot Study)

PERIOD: Séptember 1985 — June 1986 PROJECT LEADERS: Dr J. Baker, Mr J. Oliver, Ms B. Willis (James Cook University) Dr D. Kuchler (CSIRO) GBRMPA OFFICER: Dr L. Zann

SUPPORT: GBRMPA — \$25 218

OBJECTIVES: To investigate by field verification and spectroscopy the occurrence, persistence and behaviour of coral spawn slicks in the Great Barrier Reef and the West Pacific.

MANAGEMENT IMPLICATIONS: The determination of spectral characteristics of coral spawn would enable the movement of spawn slicks to be traced by remote sensing. Dispersal of coral spawn has relevance to zoning of the Great Barrier Reef Region.

METHODOLOGY: Simultaneous surface sampling, aerial photography and satellite imagery. STATUS: Report received. Pilot study completed. Study continuing on MSTGS funding. LOCALITY: Great Barrier Reef Region

239. Central Section Seagrass Survey

PERIOD: February 1986 — May 1986 PROJECT LEADER: Mr R. Coles (Qld Department of Primary Industries) GBRMPA OFFICERS: Dr W. Craik, Mr J. Bastin SUPPORT: GBRMPA — \$1700

OBJECTIVES: To survey distribution of selected seagrass beds in the Central Section.

MANAGEMENT IMPLICATIONS: Information obtained is for input to Central Section zoning to allow for careful management of this important natural resource.

METHODOLOGY: Mapping of seagrass beds after aerial survey and field sampling.

STATUS: Report received.

LOCALITY: Central Section

240. Coral Trout Poster

PERIOD: 1985 — 1986 GBRMPA OFFICER: Dr W. Craik SUPPORT: GBRMPA — \$3 595

OBJECTIVES: To produce a second edition of a popular poster showing coral trout of the Great Barrier Reef.

STATUS: Project completed.

LOCALITY: Great Barrier Reef Region

241. Investigation of Giant Clam Mortality — Lizard Island

PERIOD: July 1985 — June 1986 PROJECT LEADERS: Prof R.S.F. Campbell, Dr J. Glazebrook (James Cook University)

Dr M.W. Shinwari

GBRMPA OFFICER: Mr I. Dutton

SUPPORT: GBRMPA — \$1 253

OBJECTIVES: To investigate the cause of mortality in clams (*Tridacna gigas, T. maxima, T. derasa, Hippopus hippopus*) from Lizard Island.

MANAGEMENT IMPLICATIONS: Giant clams are one of the tourist attractions of Lizard Island and an important component of the ecosystem. Unfortunately many have died recently. This study will investigate possible causes of the deaths.

METHODOLOGY: Pathological investigation and heavy metal, pesticide and hydrocarbon analysis.

STATUS: Preliminary report received.

LOCALITY: Cairns Section—Lizard Island area **242. Seagrass Guide**

PERIOD: July 1985 — June 1986 PROJECT LEADER: Ms J. Lanyon GBRMPA OFFICER: Ms E. Eager

SUPPORT: GBRMPA — \$3 300

OBJECTIVES: To publish a key to seagrasses in the GBRMPA Special Publication series.

MANAGEMENT IMPLICATIONS: The guide will assist researchers in identifying seagrasses in the field.

STATUS: Publication completed.

LOCALITY: Great Barrier Reef Region

243. Survey of Coral and Coral Trout in Capricorn and Capricornia Sections (including Supplementary Survey)

PERIOD: November 1985 — June 1986

PROJECT LEADERS: Drs A.M. and A.L. Ayling (Sea Research)

GBRMPA OFFICER: Ms S. Driml

SUPPORT: GBRMPA — \$46 950

OBJECTIVES: To survey selected reefs in the Capricorn and Capricornia Sections of the Marine Park for coral and coral trout in conjunction with crown of thorns starfish survey.

MANAGEMENT IMPLICATIONS: This project will provide reference data on the Capricorn and Capricornia Sections relevant to zoning and management. The survey will also provide a comparative basis for future monitoring.

METHODOLOGY: Counts of coral trout, butterfly fish and large clams using transect and/or area surveys. Survey of coral using the manta tow technique.

STATUS: Project completed.

LOCALITY: Capricorn and Capricornia Sections

244. 6th International Congress of Parasitology Workshop, August 1986

PERIOD: May 1986 — December 1986

PROJECT LEADER: Dr R. Lester (University of Queensland)

GBRMPA OFFICER: Dr L. Zann SUPPORT: GBRMPA — \$1980

OBJECTIVES: To study parasites of coral reef fish during workshop and subsequently describe a number of new species.

MANAGEMENT IMPLICATIONS: Little is known of the parasites of reef fish and invertebrates. Parasites are thought to be responsible for epidemics involving *Tridacna* and other bivalves on the Great Barrier Reef.

METHODOLOGY: One-week workshop involving international experts. Collection and taxonomic description of parasites.

STATUS: Initial preparations underway. LOCALITY: Great Barrier Reef Region

245. Monitoring Swain Reefs

PERIOD: June 1986 - December 1986 PROJECT LEADER: Dr A. Ayling (Sea Research)

GBRMPA OFFICER: Dr L. Zann SUPPORT: GBRMPA - \$5000

OBJECTIVES: To monitor selected reefs of the Swains group for coral trout, crown of thorns starfish, coral cover and giant clams.

MANAGEMENT IMPLICATIONS: This project will provide reference data on the Swain Reefs relevant to zoning and management. The survey will also provide a comparative basis for future monitoring.

METHODOLOGY: Transect counts (50m x 20m) of coral trout, Acanthaster planci, Tridacna gigas and T. derasa, and chaetodontid species.

STATUS: Preparation for survey in July 1986. LOCALITY: Capricorn Section — Swain Reefs

246. Vegetation Patterns of the Southern Inshore Islands of the Great Barrier Reef **PERIOD: 1986**

PROJECT LEADER: Mr P. Brennan

(Geography, University of Queensland) SUPERVISORS: Dr G. Hill (University of Queensland)

Dr J. Davie (Q.NPWS)

GBRMPA OFFICER: Ms C. Dalliston SUPPORT: GBRMPA Augmentative Research Grant - \$400

OBJECTIVES: To determine vegetation patterns within an area of the Capricornia Section. To relate these patterns to island size, past land use, soils, topography and aspect. To assess the significance of these patterns for conservation purposes.

MANAGEMENT IMPLICATIONS: This project should provide information to evaluate proposals for acquisition of islands in the maritime estate and aid in development of management plans and zoning of the Capricornia Section.

METHODOLOGY: Field collection of vegetation data, mapping and data analysis.

STATUS: Project underway.

LOCALITY: Capricornia Section

247. A Computer Simulation of the Effects of Acanthaster planci on Coral Community Structure

PERIOD: 1986

PROJECT LEADER: Ms O. Crimp (Australian Environmental Studies, Griffith University)

SUPERVISORS: Dr P. Doherty, Dr R. Braddock GBRMPA OFFICER: Ms C. Dalliston

SUPPORT: GBRMPA Augmentative Research Grant — \$500

OBJECTIVES: To simulate the dynamics of coral community structure including response in terms of coral recovery to varying fre-quencies of perturbation. To explore the sensitivity of the model to parameters such as growth and recruitment.

MANAGEMENT IMPLICATIONS: This project will provide information on the frequency of

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A. planci outbreaks that a model coral community can sustain in the long term.

METHODOLOGY: Development and valida-tion of the FORTRAN model. Simulation using different frequencies of A. planci attack. STATUS: Project underway.

LOCALITY: Great Barrier Reef Region

248. Shearwater Census and Distribution for North West Island

PERIOD: 1986 PROJECT LEADER: Miss M. Donohoe (Geography, University of Queensland)

SUPERVISOR: Dr G. Hill

GBRMPA OFFICER: Ms C. Dalliston

SUPPORT: GBRMPA Augmentative Research Grant — \$250

OBJECTIVES: To survey and map the wedgetailed shearwater breeding population of North West Island for the 1985-86 breeding season. To analyse relationships between distribution of nesting burrows and environmental variables.

MANAGEMENT IMPLICATIONS: North West Island is recognised as the principal nesting site for wedgetailed shearwaters in the Great Barrier Reef Marine Park. Information on the habitat requirements of this species will provide baseline data for management decisions relating to breeding islands in this section of the Marine Park.

METHODOLOGY: Development of sampling design, field census and data analysis.

STATUS: Fieldwork complete. Analysis underway.

LOCALITY: Capricornia Section

249. Development and Dispersal Potential of **Coral Larvae**

PERIOD: 1986 PROJECT LEADER: Mr A. Heyward (Marine Biology, James Cook University) SUPERVISORS: Dr J. Collins,

Assoc Prof M. Pichon

GBRMPA OFFICER: Ms C. Dalliston

SUPPORT: GBRMPA Augmentative Research Grant - \$900

OBJECTIVES: To describe the embryology, rate of development and time until settlement of coral larvae derived from annual broadcast spawning coral species.

MANAGEMENT IMPLICATIONS: Information on the time requirements for inter-reef dispersal of coral larvae should be gained. This information would enable the assessment of the probabilities of neighbouring reefs supplying each other with new juvenile corals.

METHODOLOGY: Field sampling and subsequent larval settling experiments.

STATUS: Project underway.

LOCALITY: Central Section - Magnetic Island and Orpheus Island

250. The Effect of Potential Pollutants on the **Growth of Tropical Hydroids PERIOD: 1986**

PROJECT LEADER: Mr R. Ireland (Marine Biology, James Cook University)

SUPERVISORS: Dr C. Alexander, Dr G. Denton

GBRMPA OFFICER: Ms C. Dalliston

SUPPORT: GBRMPA Augmentative Research Grant — \$900

OBIECTIVES: To collect and identify species of hydroids which have potential as indicators of the biological quality of marine waters. To evaluate the sensitivity of these monitors to various pollutants.

MANAGEMENT IMPLICATIONS: The monitoring of water quality is fundamental to the management objectives of the Marine Park. There is a need for a sensitive bioassay technique for reef waters.

METHODOLOGY: Collection, identification and evaluation of hydroids.

STATUS: Project underway.

LOCALITY: Central Section

251. Microbial Degradation of Petroleum Products in Coastal Great Barrier Reef Waters

PERIOD: 1986 PROJECT LEADER: Miss R. Larsen (Botany, lames Cook University)

SUPERVISORS: Dr D. Sutton, Dr W. Shipton, Dr J. Luong-Van

GBRMPA OFFICER: Ms C. Dalliston

SUPPORT: GBRMPA Augmentative Research Grant — \$550

OBJECTIVES: To determine the range and distribution of species of petroleum-hydrocarbon degrading (HD) bacteria in representative environments of the Great Barrier Reef including John Brewer Reef. To determine the suitability of HD bacteria as indicators of change in petroleum products in tropical waters.

MANAGEMENT IMPLICATIONS: This study will provide a basis for determining long term impacts of petroleum products contributed to the reef as a result of tourist facilities and associated activities.

METHODOLOGY: Repeated sampling from field sites and subsequent identification and analysis of species and chemical analysis for petroleum-hydrocarbons.

STATUS: Project underway.

LOCALITY: Central Section - John Brewer Reef

252. An Examination of the Feeding Biology of Gastropods that Prey on Scleractinian Corals

PERIOD: 1986

PROJECT LEADER: Mr A. Page (Zoology, University of Queensland) SUPERVISOR: Dr R. Willan

GBRMPA OFFICER: Ms C. Dalliston

SUPPORT: GBRMPA Augmentative Research Grant — \$970

OBJECTIVES: To monitor the feeding behaviour of corallivorous gastropods and relate observed behaviour to their morphology. To look for related adaptations in gastropods and to monitor the effect predatory gastropods have on their coral hosts.

MANAGEMENT IMPLICATIONS: This study will increase understanding of the role of corallivorous gastropods in reef systems.

METHODOLOGY: Field work to assess gastropod feeding behaviour and subsequent analysis of gut contents.

STATUS: Project underway.

LOCALITY: Cairns Section and Capricornia Section

253. Movement of Strombus luhuanus with Particular Reference to its Ability to **Recolonize Harvested Areas PERIOD: 1986**

PROJECT LEADER: Mr M. Ritchie (Australian Environmental Studies, Griffith University)

SUPERVISORS: Dr C. Catterall, Ms J. Bodero (Aust. Env. Studies) Dr I. Poiner (CSIRO)

GBRMPA OFFICER: Ms C. Dalliston

SUPPORT: GBRMPA Augmentative Research Grant - \$900

OBJECTIVES: To examine differential movement of a typical mobile reef flat gastropod (Strombus luhuanus) with respect to age, sex, seasonal and site differences. To determine the factors which cause and inhibit the movement of S. luhuanus.

MANAGEMENT IMPLICATIONS: This project will address the complexity of interactions of factors which dictate animal movement. The information will assist in our understanding of the effects of harvesting on localised populations.

METHODOLOGY: Factorial analysis of the movements of tagged specimens in different habitats.

STATUS: Two seasons' work completed.

LOCALITY: Capricornia Section - Heron Island

ANALYSIS OF USE

95.* Man-made Noise in the Ocean

147, 226.* Compilation and Publication of Fisheries Economics of the Great Barrier Reef 186, 254. Traditional Uses of Marine Resources by Aboriginal Communities on the East Coast of Cape York Peninsula: Stages 1 and 2

PERIOD: December 1983 — June 1987 PROJECT LEADER: Mr A. Smith (Sir George Fisher Centre for Tropical Marine Studies, James Cook University)

SUPERVISORS: Dr J.T. Baker, Dr H. Marsh, Dr J. Taylor (Sir George Fisher Centre for Tropical Marine Studies, Department of Marine Biology, and Department of Behavioural Sciences, James Cook University) GBRMPA OFFICERS: Ms C. Baldwin, Ms S. Drim

SUPPORT: GBRMPA — \$47 600 (Stage 1); \$21 000 (Stage 2)

OBJECTIVES: To document the current and traditional hunting and fishing practices of the Hope Vale and Lockhart River Aboriginal Communities. 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.

MANAGEMENT IMPLICATIONS: The presence of a sizeable population of dugong north of Cape Flattery was the reason for the 'Scientific Research' zoning of an area traditionally hunted by Hope Vale residents. Knowledge of marine resources will contribute to planning and management of areas of the Marine Park adjacent to aboriginal communities.

METHODOLOGY: Field work in the Aboriginal Communities involving personal observation, participation and interview.

STATUS: Stage I completed. Project continuing.

LOCALITY: Cairns Section - Hope Vale, Lockhart River.

188, 227.* User Survey, Capricornia Section: Stages 1 and 2

189, 228.* Survey of Charter Boats, Great Barrier Reef Region: Stages 1 and 2

190. Application of Recreational Opportunity Spectrum to a Marine Park

PERIOD: 1984

PROJECT LEADER: Ms K. Means (Australian Environmental Studies, Griffith University)

SUPERVISORS: Dr T. Hundloe, Dr R. Rickson (Australian Environmental Studies, Griffith University)

GBRMPA OFFICER: Ms E. Eager

SUPPORT: GBRMPA Augmentative Research Grant - \$800

OBJECTIVES: To establish whether a marine park composed of heterogeneous units can be treated as one recreational resource amenable to Recreational Opportunity Spectrum classification.

MANAGEMENT IMPLICATIONS: Investigation of the demands for a range of recreational opportunities and available suitable sites is useful input into planning.

METHODOLOGY: Personal interviews of campers on islands in the Capricornia Section.

STATUS: Awaiting final report.

LOCALITY: Capricornia Section

255. Shell Collecting in the Great Barrier Reef Region

PERIOD: April 1986 — March 1988

PROJECT LEADER: Ms B. Barnett (consultant) GBRMPA OFFICER: Dr L. Zann

SUPPORT: GBRMPA - \$29 000

OBJECTIVES: To establish the major species collected. To estimate quantities collected and to identify major collection areas in the Great Barrier Reef Region.

MANAGEMENT IMPLICATIONS: Shell collecting in the Marine Park has been controversial. There is no information on the collecting pressure (numbers of collectors, major species and collection sites) and the impact on specific population sites.

METHODOLOGY: Literature review and field surveys.

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STATUS: Project in progress.

LOCALITY: Great Barrier Reef Region

256. History of the Great Barrier Reef PERIOD: December 1985 — June 1987

PROJECT LEADER: Ms M. Guilfoyle (James Cook University

GBRMPA OFFICER: Ms S. Driml SUPPORT: GBRMPA - \$7 000

OBJECTIVES: To prepare an outline for a history of use of the Great Barrier Reef to the 1920's and produce a bibliography.

MANAGEMENT IMPLICATIONS: This research will aid in consideration of human impact, through time, on the Great Barrier Reef.

METHODOLOGY: Literature review and investigation of sources of historical information.

STATUS: Project underway.

LOCALITY: Great Barrier Reef Region

257. Traditional Fisheries Workshop PERIOD: May 1985 — December 1986 PROJECT LEADER: Dr L. Zann (GBRMPA) GBRMPA OFFICER: Dr L. Zann SUPPORT: GBRMPA — \$21 112

OBJECTIVES: To review the status of Aboriginal and Torres Strait Islander fisheries in Northern Australia.

MANAGEMENT IMPLICATIONS: This study will enable management priorities, in traditional fisheries, to be ascertained.

METHODOLOGY: Workshops involving both users and scientists held in July 1985.

STATUS: Proceedings anticipated for publication in late 1986.

LOCALITY: Great Barrier Reef Region and Northern Australia

258. Seaplanes at Green Island PERIOD: May 1986-June 1986

PROJECT LEADER: Dr A.L. Brown (Griffith University)

GBRMPA OFFICER: Ms S. Driml

SUPPORT: GBRMPA - \$8600

OBJECTIVES: To investigate noise of and attitudes to seaplane landings on Green Island.

MANAGEMENT IMPLICATIONS: This project should provide the basis for evaluation of applications for permits to operate seaplanes in the vicinity of Green Island.

METHODOLOGY: Survey of visitor percep-tions of seaplanes. Map the type and intensity of use of areas of Green Island with regard to visitors, vessels and seaplanes.

STATUS: Report received and accepted.

LOCALITY: Cairns Section — Green Island

259. A Study of Mobility and Fishing Strategies for the Queensland East Coast Prawn Fishery PERIOD: 1986

PROJECT LEADER: Ms Y. Beurteaux (Geography, James Cook University)

SUPERVISÓR: Dr S. Bandaranaike

GBRMPA OFFICER: Ms C. Dalliston

SUPPORT: GBRMPA Augmentative Research Grant - \$900

OBJECTIVES: To determine temporal, geographic and numerical trends amongst the East Coast Prawn Fishery. To relate such trends to fishing strategies.

MANAGEMENT IMPLICATIONS: The East Coast Prawn Fishery is a widespread and commercially important user of the Reef Region. Changes and trends within the fishery are important for their predictive value for management of both the Reef and the fishery. METHODOLOGY: Survey by personal interviews of fishermen. Study of aerial surveillance and log book data.

STATUS: Project underway.

LOCALITY: Great Barrier Reef Region

260. The Economic Characteristics and Significance of the Great Barrier Reef Region Shell 'Trade' PERIOD: 1986

PROJECT LEADER: Miss K. Herbert (Australian Environmental Studies, Griffith University) SUPERVISORS: Dr T. Hundloe, Mr J. Ware GBRMPA OFFICER: Ms S. Driml SUPPORT: GBRMPA — \$2910 (including

Augmentative Research Grant)

OBJECTIVES: To document and value the 'trade' in shells and artifacts in North Queensland both in terms of world 'trade' and commercial and amateur collection.

MANAGEMENT IMPLICATIONS: Current information on the extent and economic value of the shell 'trade' is necessary for the management of shell collecting activities.

METHODOLOGY: Personal interviews with shell collectors, retailers and wholesalers and subsequent data analysis.

STATUS: Project underway.

LOCALITY: Great Barrier Reef Region

261. The Effect of Noise on Selected Seabird **Populations on the Great Barrier Reef**

PERIOD: 1986 PROJECT LEADER: Mr R. Mathers (Australian Environmental Studies, Griffith University) SUPERVISORS: Dr L. Brown, Dr K. Hulsman GBRMPA OFFICER: Ms C. Dalliston

SUPPORT: GBRMPA Augmentative Research Grant - \$1000

OBJECTIVES: To determine the response of certain species of seabirds to noise and shapes of aircraft. To determine whether there is 'habituation' to the noise stimulus.

MANAGEMENT IMPLICATIONS: This project will provide data basic to the formulation of effective long-term management plans of reef seabird populations.

METHODOLOGY: Literature search, followed by design, development and conduct of field experiments.

STATUS: Project underway.

LOCALITY: Capricornia Section

MANAGEMENT STRATEGIES 217. Reef Walking Capability Assessment

PERIOD: July 1984 - December 1986 PROJECT LEADERS: Dr A. Kay, Dr M. Liddle (Australian Environmental Studies, Griffith University)

GBRMPA OFFICER: Mr I. Dutton SUPPORT: GBRMPA - \$5 000

OBJECTIVES: To develop assessment techniques for evaluating the impact of reef walking and determine the capability of reef areas for walking activities. To produce a field manual

MANAGEMENT IMPLICATIONS: Reef walking currently has impacts on small, accessible areas of reef and may need to be regulated.

METHODOLOGY: Preparation of practical handbook based on previous field studies on Heron Island and Hardy Reefs.

STATUS: Report received and awaiting acceptance.

LOCALITY: Great Barrier Reef Region

218. Shipping Risk Analysis

PERIOD: July 1984 — June 1986 PROJECT LEADERS: Prof K. Stark, Dr M.K. James (Civil and Systems Engineering, James Cook University), Mr T. Jenssen (Det Norske Veritas)

GBRMPA OFFICER: Mr I. Dutton

SUPPORT: GBRMPA - \$7000; JCU Special Grant; Det Norske Veritas

OBJECTIVES: To develop an approach to risk assessment in relation to shipping accidents in the Great Barrier Reef Region such as ship collisions or groundings.

MANAGEMENT IMPLICATIONS: Areas of greatest potential risks should be identified.

METHODOLOGY: Computer modelling and simulation of risks.

STATUS: Report received and awaiting acceptance.

LOCALITY: Great Barrier Reef Region

219.* Workshop on Response to Hazardous **Chemical Spills**

222.* Monitoring of the Lady Musgrave Island **Reef following Stranding of Vessel TNT** Alltrans

262. Workshop on Offshore Effects of Cyclone Winifred

PERIOD: March 1986 — December 1986 PROJECT LEADER: Dr W. Craik GBRMPA OFFICER: Mr I. Dutton SUPPORT: GBRMPA — \$3 240

OBJECTIVES: To co-ordinate scientific, management, government and private interests to discuss the impact of Cyclone Winifred and possible future cyclone response.

MANAGEMENT IMPLICATIONS: By determining the short and long-term effects of tropical cyclones and establishing research priorities, future cyclones will reveal greater amounts of information as regards management.

METHODOLOGY: One-day workshop involving seminars and group discussion.

STATUS: Workshop held 20 June 1986. Proceedings to be published.

LOCALITY: Cairns and Central Sections

263. The Recreational Usage of Private Boats in the Whitsunday Islands **PERIOD: 1986**

PROJECT LEADER: Ms W. Goodburn (Geography, University of Sydney) SUPERVISÓR: Mr B. Ó'Rourke GBRMPA OFFICER: Ms C. Dalliston SUPPORT: GBRMPA Augmentative Research Grant — \$900

OBJECTIVES: To determine the recreational usage of part of the Whitsunday Islands by private boat owners from mainland ports. To identify potential conflicts between various recreational uses and management objectives. MANAGEMENT IMPLICATIONS: Information on the recreational usage of boats is necessary for effective zoning to control human activity and its effect on the environment.

METHODOLOGY: Survey by questionnaire and compilation of map of boating and other recreational activities.

STATUS: Initial map completed.

LOCALITY: Central Section

264. The Great Barrier Reef Marine Park: An Appropriate Management Tool for the Australian Fishing Zone?

PERIOD: 1986 PROJECT LEADER: Mr L. Kriwoken (Cent. Env. Studies, University of Tasmania) SUPERVISORS: Dr P. Hay, Dr B. Davis GBRMPA OFFICER: Ms C. Dalliston SUPPORT: GBRMPA Augmentative Research

Grant - \$900

OBJECTIVES: To prepare alternative strategies for the planning and management of a system of marine and estuarine protected areas in the Australian Fishing Zone. To use the management framework of the Great Barrier Reef Marine Park as a case study.

MANAGEMENT IMPLICATIONS: This project will provide an evaluation of the role of relevant GBRMPA planning and management expertise in the future provision of marine and estuarine protected area designations.

METHODOLOGY: Desk-top study of GBRMPA management framework.

STATUS: Field work and interviews underway. LOCALITY: Great Barrier Reef Region

265. Planning Study of the Capricornia Section, Great Barrier Reef Marine Park **PERIOD: 1986**

PROJECT LEADER: Ms D.J. Rosier (Regional and Town Planning, University of Queensland)

SUPERVISORS: Prof J. Kozlowski, Dr G. Hill GBRMPA OFFICER: Ms C. Dalliston

SUPPORT: GBRMPA Augmentative Research Grant - \$700

OBJECTIVES: To develop a method to be used in marine park planning in ecologically sensitive environments where physical and ecological constraints can be identified and incorporated in the planning process along with opportunities for development.

MANAGEMENT IMPLICATIONS: The identification of constraints to development of the

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natural environment is an important step in planning. Given the constraints the identification and incorporation of development possibilities may proceed. The use of a methodology to ensure integration of constraints and opportunities is desirable.

METHODOLOGY: Develop a method for identifying the various natural constraints using the ultimate environmental threshold method and incorporating the particular usage demands in the Marine Park. The method will be tested in the Capricornia Section of the Marine Park.

STATUS: Field work for case study commenced.

LOCALITY: Capricornia Section

ENVIRONMENTAL DESIGN 221.* Guidelines and Methodologies for

Environmental Assessment of Offshore Development

266. Checklist of the Effects of Offshore Developments

PERIOD: October 1985 — May 1986 PROJECT LEADER: Ms M. Olson GBRMPA OFFICER: Mr I. Dutton SUPPORT: GBRMPA - \$1500

OBJECTIVES: To prepare a list of types of effects offshore developments may have on physical, biological, social and economic environments, cross referenced to types of development. To outline criteria for use in determining significance of future developments. To give examples of environmental management techniques used elsewhere.

MANAGEMENT IMPLICATIONS: Necessary to provide background information for a general reference paper on offshore development.

METHODOLOGY: Review of literature and collection of information on offshore developments internationally.

STATUS: Report completed and accepted. LOCALITY: Great Barrier Reef Region

GREAT BARRIER REEF DATABASES

191.* Collaborative Reef Geographic Information System (CORGIS) based upon **Extensions of the Relational Database Model**

MECHANICS OF INFORMATION TRANSFER

117. Australian Marine Research in Progress

PERIOD: July 1985 — June 1986 PROJECT LEADERS: Australian Institute of Marine Science, Great Barrier Reef Marine Park Authority, Victorian Institute of Marine Sciences, Central Information, Library and Editorial Section (CSIRO)

GBRMPA OFFICER: Dr W. Craik SUPPORT: GBRMPA — \$12 050

OBJECTIVES: To continue collection of information for Australian Marine Research in Progress (AMRIP), a computer-stored system of information on marine research projects in Australia.

MANAGEMENT IMPLICATIONS: This project is designed to produce a current summary of on-going research in the Great Barrier Reef Region (and elsewhere), which is readily accessible and readily updated.

METHODOLOGY: National distribution of questionnaires on Marine Research in Progress to gather information for editing and classification, data entry and printing. Development of an on-line system.

STATUS: Hard copies of both a Great Barrier Reef Region edition and an Australia-wide edition were produced. Data collection ongoing. AMRIP available on-line through AUSTRALIS.

118.* Aquatic Science Research Electronic Bulletin

223.* Study of Participation in the Cairns Section Public Participation Program

267. Evaluation of Central Section Public Participation Program

PERIOD: December 1985 — August 1986

PROJECT LEADERS: Dr P. Pearce,

Ms G. Moscardo, Mr G. Ward (James Cook University)

GBRMPA OFFICER: Ms S. Driml

SUPPORT: GBRMPA — \$4960

OBJECTIVES: To evaluate the impact of the Great Barrier Reef Marine Park Authority television advertisement on the general public and evaluate the attitudes of people who sent in representations to the Draft Zoning Plan Public Participation Program.

MANAGEMENT IMPLICATIONS: The information gained will allow design of the most effective means of communicating to the public for both participation and education purposes.

METHODOLOGY: Telephone and mail surveys.

STATUS: Survey results obtained. Awaiting final report.

LOCALITY: Central Section

268. Marine Research and Management Information System (MARAMIS)

PERIOD: January 1986 — June 1986 GBRMPA OFFICER: Dr W. Craik

SUPPORT: GBRMPA — staff and resources

OBJECTIVES: To produce a current list of marine research and management programs for the South East Asian Region.

MANAGEMENT IMPLICATIONS: This project is designed to produce a current summary of on-going marine research and management programs to enhance program co-ordination and minimise duplication.

METHODOLOGY: Development and distribution of questionnaires on current programs. STATUS: Development of form design underway.

LOCALITY: South East Asian Region

COTSAC RECOMMENDED RESEARCH

210. Role of *Acanthaster planci* in Reef Degradational Processes: Historical Perspective and Current Influence

PERIOD: June 1985 — September 1986 PROJECT LEADER: Assoc Prof R. Henderson (Geology, James Cook University) GBRMPA OFFICER: Dr L. Zann SUPPORT: GBRMPA — \$79 540

OBJECTIVES: To elucidate the prehistory of *Acanthaster planci* in the Great Barrier Reef Region and to determine the rates and processes of reef degradation which follow destruction of hard coral communities.

MANAGEMENT IMPLICATIONS: Rigorous establishment of the prehistory of *A. planci* in the Great Barrier Reef Region will show whether *A. planci* infestations are a contemporary aberration or part of a long-term ecological pattern. Management strategies with respect to *A. planci* must take account of this temporal perspective.

METHODOLOGY: Field survey and collection of sediment and core samples for examination and C¹⁴ dating.

STATUS: Field work completed. Analysis underway.

LOCALITY: Great Barrier Reef Region

269. Survey of Crown of Thorns Starfish in Capricorn and Capricornia Sections

PERIOD: November 1985 — June 1986 PROJECT LEADERS: Drs A.M. and A.L. Ayling (Sea Research)

GBRMPA OFFICER: Ms S. Driml

SUPPORT: GBRMPA — \$15 000

OBJECTIVES: To survey selected reefs in the Capricorn and Capricornia Sections for crown of thorns starfish. Surveys in conjunction with coral and coral trout surveys.

MANAGEMENT IMPLICATIONS: This project will provide reference data on the Capricorn and Capricornia Sections relevant to zoning and management. The survey will also provide a comparative basis for future monitoring.

METHODOLOGY: Manta tow surveys of each reef perimeter. Counts of crown of thorns starfish using straight line transect surveys.

STATUS: Project completed.

LOCALITY: Capricorn and Capricornia Sections

270. Survey of Crown of Thorns Starfish Predators on or in the Vicinity of Reefs of the Great Barrier Reef

PERIOD: June 1986 — September 1987 PROJECT LEADER: Assoc Prof R. Endean (Zoology, University of Queensland) GBRMPA OFFICER: Dr L. Zann SUPPORT: GBRMPA — \$50 000

OBJECTIVES: To identify crown of thorns starfish predators. To determine the population density of identified predators at a range of reefs subject to a range of activities.

MANAGEMENT IMPLICATIONS: Information on predators of crown of thorns starfish has implications for the management of these predators including tritons and various fishes. METHODOLOGY: In situ and laboratory studies to identify generalist and specialist predators. Census techniques to be determined by the species of predators involved.

STATUS: Project commenced.

LOCALITY: Great Barrier Reef Region

271. The Relationships between Crown of Thorns Starfish Outbreaks and Water Mass Characteristics in the Great Barrier Reef

PERIOD: February 1986 — December 1987 PROJECT LEADER: Mr D. van R. Claasen, Dr L. Zann (GBRMPA)

GBRMPA OFFICER: Dr L. Zann

SUPPORT: GBRMPA - \$38 000

OBJECTIVES: To determine broad scale pat-terns of productivity and terrestrial water discharge using coastal zone colour scanning and other remotely sensed imagery. To relate these patterns to Acanthaster planci distribution.

MANAGEMENT IMPLICATIONS: This study will provide information on the relationship between Acanthaster planci outbreaks and highly productive waters off continental land masses.

METHODOLOGY: Analysis of CZCS images to delineate areas showing chlorophyll 'a' and water colour distribution over the Region.

STATUS: Acquisition made of hardware/ software analysis package and of some imagery.

LOCALITY: Great Barrier Reef Region

272. Potential Human Causes of Acanthaster planci Aggregations in the South Pacific

PERIOD: April 1986 — July 1987

PROJECT LEADERS: Dr L. Zann (GBRMPA) Ms G. Brodie (University of South Pacific, Fiji) GBRMPA OFFICER: Dr L. Zann

SUPPORT: GBRMPA - \$12 000

OBJECTIVES: To identify commonalities among widely separated geographic areas which have experienced crown of thorns starfish outbreaks. To test the 'predator removal' hypothesis.

MANAGEMENT IMPLICATIONS: Human influences may have contributed (in part or whole) to crown of thorns starfish outbreaks in Fiji and other areas of the South Pacific.

METHODOLOGY: A database of Pacific infestations is to be set up from reports of previous infestations and information obtained from surveys and questionnaires.

STATUS: Field work commenced.

LOCALITY: Fiji Islands, Great Barrier Reef Region

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273. Socio-economic Consequences of Major **Populations of Crown of Thorns Starfish**

PERIOD: May 1986 — May 1987 PROJECT LEADER: Dr T. Hundloe (Griffith University)

GBRMPA OFFICER: Ms S. Driml SUPPORT: GBRMPA — \$39 800

OBJECTIVES: To ascertain the financial, employment and net economic effects on the users of the Great Barrier Reef of major populations of crown of thorns starfish. To assess users' attitudes to crown of thorns starfish.

MANAGEMENT IMPLICATIONS: The economic and sociological consequences of major populations of crown of thorns starfish have important implications for management decision making.

METHODOLOGY: Design and development of questionnaires and subsequent analysis and modelling of data resulting from field surveys

STATUS: Project underway.

LOCALITY: Great Barrier Reef Region

274. Biological and Economic Risk Analysis Study to Contribute to Assessment of the Need for Control of Crown of Thorns Starfish PERIOD: May 1986 — May 1987

PROJECT LEADERS: Dr T. Hundloe, Dr J. Parslow (Griffith University)

GBRMPA OFFICER: Ms S. Driml

SUPPORT: GBRMPA — \$33 000

OBJECTIVES: To undertake a risk analysis to contribute to assessment of the need for control of crown of thorns starfish.

MANAGEMENT IMPLICATIONS: A risk analysis will determine if control is justified, the efficiency and cost-effectiveness of various control methods and strategies.

METHODOLOGY: Consultation and literature review followed by development of bioeconomic models.

STATUS: Project underway.

LOCALITY: Great Barrier Reef Region

275. Oral History of Human Use and Experience of Crown of Thorns Starfish on the Great Barrier Reef

PERIOD: March 1986 — September 1987 PROJECT LEADERS: Dr A. Chase, M. Finnane, Ms R. Ganter (Griffith University) GBRMPA OFFICER: Ms E. Eager SUPPORT: GBRMPA — \$10 000

OBJECTIVES: To undertake an oral history study to investigate human use of the reef and experience of crown of thorns starfish. MANAGEMENT IMPLICATIONS: This study will meet the need to collect and collate further historical information (often unwritten) from past users of the Great Barrier Reef, so that frequency of events such as crown of thorns starfish outbreaks can be ascertained. METHODOLOGY: A socio-historian will interview contacts and establish a network of knowledge-bearers regarding the extractive industries of the Reef. These interviews will be complemented by archival manuscripts and correspondence.

STATUS: Field work and literature review underway.

LOCALITY: Great Barrier Reef Region

276. Studies of Diseases of the Crown of Thorns Starfish

PERIOD: January 1986 — April 1987 PROJECT LEADER: Prof R.S.F. Campbell (James Cook University) GBRMPA OFFICER: Dr L. Zann

SUPPORT: GBRMPA — \$23 389

OBJECTIVES: To obtain data on naturally occurring diseases (bacterial, viral, parasitic) of crown of thorns starfish by identifying and characterising specific diseases and gathering epidemiological data on diseases.

MANAGEMENT IMPLICATIONS: This study will increase understanding of echinoderm biology with its relevance to the coral reef ecosystem as a whole, as well as furthering the understanding of outbreak phenomena.

METHODOLOGY: Collection, statistical planning and analysis of epidemiological data through laboratory studies involving tissue culture and virus isolation.

STATUS: The project is underway and supplements MSTGS funded research.

LOCALITY: Great Barrier Reef Region

277. Identification of Bacterial Populations Associated with Crown of Thorns Starfish and Assessment of their Role in the Ecology of this Starfish

PERIOD: January 1986 — April 1987 PROJECT LEADER: Dr D.C. Sutton (James Cook University)

GBRMPA OFFICER: Dr L. Zann SUPPORT: GBRMPA — \$18 737

OBJECTIVES: To identify bacteria associated with *A. planci* and to determine whether the unique bacterial flora on these animals or other marine bacteria contribute to starfish survival or death.

MANAGEMENT IMPLICATIONS: The possibility for biological control of crown of thorns starfish exists and this project will provide the necessary information to assess that possibility.

METHODOLOGY: Laboratory studies on Fijian and Australian bacterial isolates collected to date. Collection of further isolates and development of taxonomic and diagnostic procedures.

STATUS: Project underway.

LOCALITY: Fiji Islands and Great Barrier Reef Region

278. Trial Control of Crown of Thorns Starfish on the Great Barrier Reef

PERIOD: May 1986 — December 1986 PROJECT LEADER: Dr L. Zann GBRMPA OFFICER: Dr L. Zann SUPPORT: GBRMPA — \$30 000 OBJECTIVES: To test feasibility of hand controlling crown of thorns starfish to assess costs and benefits. To establish contingency plans for infestations and conduct a variety of related experiments.

MANAGEMENT IMPLICATIONS: Volunteer divers may be of use for local controls on reefs of special importance to tourism and science. Chemicals used in controls may be hazardous to the environment and therefore need to be tested in the field.

METHODOLOGY: Site of trial control determined in conjunction with AIMS survey results. Site should possess good coral cover with a high crown of thorns starfish population. Volunteer divers will then be used to destroy the starfish to evaluate the efficiency of control methods. Several methods of killing to be examined.

STATUS: Preliminary survey conducted. Clearance to proceed in July 1986.

LOCALITY: Central Section - Grub Reef

279. A Review of Crown of Thorns Starfish Control Programs in Japan

PERIOD: November 1985 — June 1986 PROJECT LEADER: Ms Linda Worland (Griffith University) GBRMPA OFFICER: Dr L. Zann

SUPPORT: GBRMPA — \$841

OBJECTIVES: To interview Japanese scientists and officials engaged in control programs. To collect and translate reports, survey techniques and control methods and assess their relevance to the Great Barrier Reef.

MANAGEMENT IMPLICATIONS: 'Non-biological control' is a designated program of the COTSAC studies. This study has relevance to control programs on the Great Barrier Reef when the Japanese experience has been cited as a reason for not attempting largescale controls.

METHODOLOGY: Interviews of Japanese experts. Literature translation and review.

STATUS: Field work completed. Progress report received.

LOCALITY: Japan

280. Population Dynamics of Crown of Thorns Starfish on Suva Barrier Reef

PERIOD: September 1985 — October 1986 PROJECT LEADERS: Mr J. Brodie (University of the South Pacific, Fiji) Dr L. Zann (GBRMPA) GBRMPA OFFICER: Dr L. Zann SUPPORT: GBRMPA — \$4 651

OBJECTIVES: To monitor growth, abundance and distribution of populations of juveniles and adult crown of thorns starfish on a coral reef.

MANAGEMENT IMPLICATIONS: This is the first time a population of *A. planci* has been followed from settlement. A better understanding of the crown of thorns starfish phenomenon on the Great Barrier Reef will result from these studies.

METHODOLOGY: Monthly sampling of dis-tribution and abundance of starfish to continue the monitoring program commenced in 1979.

STATUS: Several monthly reports have been received. Sampling continuing. LOCALITY: Fiji Islands

281. Monitoring Juvenile Crown of Thorns Starfish on Great Barrier Reef (Pilot Study)

PERIOD: June 1986 — December 1986 PROJECT LEADER: Mr R. Bell (James Cook University) SUPERVISOR: Dr W. Craik

GBRMPA OFFICER: Dr L. Zann

SUPPORT: GBRMPA - \$5 000

OBJECTIVES: To study population dynamics of juvenile starfish on Rib Reef and Pelorus Island (Pilot study).

MANAGEMENT IMPLICATIONS: Studies of the early life history of crown of thorns starfish need to be followed up by investiga-tion of their population dynamics to aid in the understanding of the 'Acanthaster phenomenon'.

METHODOLOGY: Surveys of selected reefs. Detailed study at Pelorus Island Reef.

STATUS: Project underway. LOCALITY: Central Section

APPENDIX E FINANCIAL STATEMENTS

GREAT BARRIER REEF MARINE PARK AUTHORITY Financial Statements for the Year Ended 30 June 1986

In our opinion, the accompanying Statement of Activity, Statement of Assets and Liabilities, Statement of Capital Accumulation and Statement of Sources and Application of Funds, have been prepared in accordance with the 'Guidelines for the Form and Standard of Financial Statements of Commonwealth Undertakings' approved by the Minister for Finance, as amended from time to time, and:

- (a) show fairly the operations of the Authority for the financial year ended 30 June 1986 and the financial position as at 30 June 1986; and
- (b) at the date of this certificate there are reasonable grounds to believe that the Authority will be able to pay its debts as and when they fall due.

GRAEME KELLEHER Chairman DONALD W. KINSEY Executive Officer

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| STATEMENT OF ACTIVITY for the year ended 30 June 1986 | | | |
|---|------------------|--|-----------------------------|
| | Note | \$ | \$ |
| REVENUE Parliamentary appropriations — Operational | | 4884000 | |
| - Capital | 3(a)(b) | 1 380 000 | 6 384 000 |
| Queensland contribution to day-to-day management Interest Miccollangous revenue | 3(a)(c) | | 750 000 31 057 36 150 |
| Recovered assets | 5 | | 9412 |
| Less Transfer to Capital Accumulation | 6 | | 7 210 619 538 318 |
| Total operating revenue | | | 6 672 301 |
| EXPENSES Current expenses Expenses of the Authority Expenses of the Great Barrier Reef Consultative Committee Executive and Secretariat Salaries and Allowances Research and Monitoring Planning Park Management Education/Information Administration Great Barrier Reef Aquarium Excess of operating revenue over current expenses | 7 8 9 4 | 65 458 21 469 110 971 2 037 264 1 255 2570 227 523 63 172 1701 359 345 107 520 554 120 579 | <u>6 466 026</u> 206 275 |
| Loss on operating revenue over current expenses Provisions and other unfunded charges Depreciation of fixed assets Long service leave Annual leave | | 212 296 35 653 23 184 | 27 755 |
| Leave fares | | (538) | 2/0 595 |
| Unfunded liability transferred to Capital Accumulation | 4 | | 92 075 |

| | Note | \$ | \$ |
|---|------|---------|-----------|
| ASSETS | | | |
| Current Assets | | | |
| Cash at bank | | 512 646 | |
| Advances and prepayments | | 25 905 | |
| Unexpended capital grants for day-to-day management | 10 | 56 899 | |
| Debtors | | 15 507 | |
| Total Current Assets | | | 610 957 |
| Fixed Assets | 2(c) | | |
| Net written down values | | | |
| Furniture, fittings and display equipment | | 86 265 | |
| Office machines | | 44790 | |
| Audio-visual and photographic equipment | | 49 214 | |
| Marine and diving equipment | | 80 224 | |
| Computer equipment | | 386 507 | |
| Computer software | | 168 544 | |
| Scientific and technical equipment | | 99725 | |
| Vehicles and mobile plant | | 100 213 | |
| Other plant and equipment | | 16 876 | |
| Construction work in progress | | 96 176 | |
| Improvements to leasehold property | | | |
| — Fixtures and fittings | | 148 314 | |
| Total Fixed Assets | | | 1 276 848 |
| Total Assets | | | 1 887 805 |
| | | | |
| | | | |
| LIABILITIES | | | |
| Creditors | | 110 | |
| Accrued expenses | | 26.657 | |
| Provision for long service leave | 11 | 6929 | |
| Provision for applial leave | 11 | 237.864 | |
| Provision for leave fares | | 23 678 | |
| | | | |
| I otal Current Liabilities | | | 413 683 |
| Non-current Liabilities | 44 | | 222.001 |
| Provision for long service leave | 11 | | 333 891 |
| Total Liabilities | | | 747 574 |
| SURPLUS OF ASSETS OVER LIABILITIES | | | 1 140 231 |
| Financed by ACCUMULATED CAPITAL (from Statement of Capital Accumulation) | | | |

STATEMENT OF CAPITAL ACCUMULATION for the year ended 30 June 1986

| | Note | \$ | \$ |
|--|------|---------|-----------|
| Balance from previous years | 12 | 693 988 | |
| Appropriated funds used for capital works and services | 6 | 538 318 | 1 232 306 |
| Transfer from Statement of Activity — Deficit for year | | | 92 075 |
| Accumulated Capital at 30 June 1986 | | | 1 140 231 |

STATEMENT OF SOURCES AND APPLICATION OF FUNDS for the year ended 30 June 1986

| | Note | \$ | \$ |
|---|------|-----------|-------------|
| SOURCES OF FUNDS | | | |
| Funds from operations | | | |
| Inflows of funds from operations | | 6 662 889 | |
| Less outflows of funds from operations | | 6 466 026 | 196 863 |
| Transferred from Revenue to Capital Accumulation | | | 538 318 |
| Current Assets | | | |
| Advances and prenavments | | 13 385 | |
| Debtors | | 321 | 13706 |
| Debiors | | | 137.00 |
| Fixed Assets | | | |
| Proceeds from sales of Fixed Assets | | 2 400 | |
| Office machines | | 3 400 | |
| Audio-visual and photographic equipment | | 2 340 | |
| Vohicles and mobile plant | | 5 850 | 44 890 |
| Venicles and mobile plant | | | 4000 |
| Increase in Liabilities | | | |
| Current Liabilities | | | 40 512 |
| Creditors | | | 49512 |
| Total sources of funds | | | 843 289 |
| | | | CREAT AND A |
| | | | |
| APPLICATION OF FUNDS | | | |
| Current Assets | | | |
| Carb at hank | | 267 044 | |
| Unexpended capital grants for day-to-day management | | 11 501 | 278 545 |
| | | | |
| Fixed Assets | | 22.014 | |
| Office machines | | 15 019 | |
| Audio-visual and photographic equipment | | 20 901 | |
| Marine and diving equipment | | 18 896 | |
| Computer equipment | | 204 073 | |
| Computer software | | 100 272 | |
| Scientific and technical equipment | | 57 393 | |
| Vehicles and mobile plant | | 14 236 | |
| Other plant and equipment | | 5 656 | |
| Construction work in progress | | 71 976 | |
| Improvements to leasehold property | | | |
| — Fixtures and fittings | | 31 309 | 562 645 |
| Reduction in Liabilities | | | |
| Current Liabilities | | | |
| Accrued salary expenses | | | 2 0 9 9 |
| Total application of funds | | | 843 289 |

NOTES TO AND FORMING PART OF THE FINANCIAL STATEMENTS for the year ended 30 June 1986

1. CHANGE IN BASIS OF ACCOUNTING

In May 1983 and subsequently in February 1985 the Department of Finance issued 'Guidelines for the Form and Standard of Financial Statements of Commonwealth Undertakings' which require that the Authority prepare financial statements on an accrual basis. Accordingly the financial statements of the Authority for the year ended 30 June 1986 have been prepared on an accrual basis.

2. ACCOUNTING POLICIES

The following accounting policies have been adopted in the preparation of the accounts.

- (a) Accounts Format
 - The accounts of the Authority have been prepared in accordance with:

 the 'Guidelines for the Form and Standard of Financial Statements of Commonwealth Undertakings', as applicable to "Other Undertakings", issued by the Department of Finance in February 1985; and

- accounting standards issued by Australian accounting bodies (where applicable).

(b) Historical Cost Convention

These accounts have been prepared on the basis of the historical cost convention and except where stated do not show the current cost of specific assets and the impact of such costs on operating results.

(c) Depreciation of Fixed Assets

Capitalisation occurs on all items which cost more than \$400. Fixed assets are depreciated by the straight line method over their estimated useful lives. Details of accumulated depreciation are:

| | | Accumulated | Net Written |
|--|---------|---------------|-------------|
| | Cost | Depreciation | Down Value |
| | \$ | \$ | \$ |
| Furniture fittings and display aquipment | 118 500 | 32 334 | 86 265 |
| Office machines | 79 279 | 34 489 | 44 790 |
| Audio-visual and photographic equipment | 76 294 | 27 080 | 49 214 |
| Marine and diving equipment | 155 435 | 75 211 | 80 224 |
| Computer equipment | 513 848 | 127 341 | 386 507 |
| Computer software | 179 482 | 10 938 | 168 544 |
| Scientific and technical equipment | 126 520 | 26795 | 99725 |
| Vehicles and mobile plant | 133 873 | 33 660 | 100 213 |
| Other plant and equipment | 23 580 | 6704 | 16876 |
| Construction work in progress | 96 176 | 1111111 State | 96 176 |
| Improvements to leasehold property | | | |
| - Fixtures and fittings | 198 902 | 50 588 | 148 314 |
| Total | 1701988 | 425 140 | 1 276 848 |
| | | | |

(d) Advances to Consultants

Under the terms of certain contracts with consultants payments are made in advance. Except for expenditure on assets which, under the terms of the contract become the property of the Authority from the date of acquisition, such advances are fully expensed in the year of payment. Where ownership of assets vests in the Authority on the completion of a contract, such assets are brought on charge by the Authority at their written down value and depreciated over their remaining useful life (refer Note 5 for details of recovered assets in 1985-86).

(e) Day-to-day Management Advances Except for expenditure on those assets under the initial capital works program where ownership vests in the Authority, advances to Queensland National Parks and Wildlife Service for day-today management are fully expensed in the year of payment (refer Note 3 for details of the dayto-day management item).

3. DAY-TO-DAY MANAGEMENT OF THE GREAT BARRIER

REEF MARINE PARK

- (a) Principles agreed between the Commonwealth and Queensland Governments relating to the day-to-day management of the Great Barrier Reef Marine park provide for:
 - the Queensland National Parks and Wildlife Service (Q.NPWS) to carry out the day-to-day management of the Great Barrier Reef Marine Park, subject to the Authority
 - the Commonwealth to fund 100% of an initial capital works program (in the first three years or so) required to establish management of the Great Barrier Reef Marine Park on a sound basis; assets purchased under this program, except for immovable assets situated on property owned by the Queensland Government, are owned by the Authority

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- other capital costs (i.e. the post-initial program) of day-to-day management of the Great Barrier Reef Marine Park to be shared equally between the two Governments; assets purchased under this program are owned by Q.NPWS
- the Commonwealth and Queensland to meet in equal shares the recurrent costs for day-today management in relation to the Great Barrier Reef Marine Park (which may include Queensland national parks or Queensland marine parks, the use or management of which would or might affect the Great Barrier Reef Marine Park)
- the Authority to administer funds provided by the Commonwealth and Queensland for these purposes.
- (b) The Commonwealth appropriation for day-to-day management was based on:

| (i) (ii) | Recurrent and Post-Initial Capital Programs Initial Capital Works | \$ 1 076 000 304 000 |
|-------------|--|----------------------------|
| | | 1 380 000 |

- (c) The Queensland contribution to day-to-day management was \$750 000.
- (d) Financial statements for day-to-day management which have been prepared by Q.NPWS and audited by the Queensland Auditor General are at Note 18.

4. ABNORMAL ITEM

The operating result reflects unexpended Commonwealth appropriation for day-to-day management carried forward as cash at bank to meet 1986-87 commitments. A saving of \$326 000 in Commonwealth funds corresponded to a reduction in the Queensland funding of \$226 000 (for recurrent and post-initial capital works programs) plus further savings in these programs of \$100 000.

5. RECOVERED ASSETS

Refer Note 2(d) for details of accounting policy on recovered assets. The written down value of recovered assets brought on charge during 1985-86 was \$9412.

6. TRANSFER TO CAPITAL ACCUMULATION

The funds transferred direct from Revenue to the Capital Accumulation Account represent capital expenditure from the appropriation items as follows:

| | \$ |
|-----------------------|-----------|
| Operational | 263 388 |
| Capital | 120 000 |
| Day-to-day management | 154 930 * |
| | 538 318 |

* This figure represents expenditure on assets purchased under the initial capital works program (excluding immovable assets located on land owned by the Queensland Government). As detailed in Note 3 the ownership of all other assets purchased under the day-to-day management program vests in the Queensland Government and costs are accounted for as operational expenditure by the Authority.

7. EXPENSES OF THE AUTHORITY

This item includes remuneration of \$9 414 paid to part-time members in accordance with the Remuneration Tribunal Determination.

8. EXPENSES OF THE GREAT BARRIER REEF CONSULTATIVE COMMITTEE This item includes sitting fees totalling \$5 208 paid to part-time members in accordance with the Remuneration Tribunal Determination.

9. SALARIES AND ALLOWANCES

This item includes remuneration totalling \$62663 paid to the full-time Chairman of the Authority in accordance with the Remuneration Tribunal Determination.

10. UNEXPENDED CAPITAL GRANTS FOR DAY-TO-DAY MANAGEMENT

This item represents unexpended initial capital works funds held by the Q.NPWS as at 30 June 1986. Note 3(a) refers to ownership of assets purchased under this program.

11. PROVISION FOR LONG SERVICE LEAVE

Provision has been made for pro-rata entitlements of all staff who have at least five years eligible service at balance date. The current liability represents the estimated value of long service leave that is proposed to be taken by staff during the succeeding year.

12. BALANCE FROM PREVIOUS YEARS

| The balance of capital accumulation from previous years was assessed a | as follows: | |
|--|-------------|-----------|
| | \$ | \$ |
| ASSETS | | |
| Current Assets | | |
| Cash at bank | 245 602 | |
| Advances and prepayments | 39 290 | |
| Unexpended capital grants to day-to-day management | 45 398 | |
| Debtors | 15 828 | |
| Total Current Assets | | 346 118 |
| Fixed Assets* | | 989733 |
| Total Assets | | 1 335 851 |
| | | |
| LIABILITIES | | |
| Current Liabilities | | |
| Creditors | 69 0 43 | |
| Accrued expenses | 28756 | |
| Provision for long service leave | 15 088 | |
| Provision for annual leave | 214 680 | |
| Provision for leave fares | 24 216 | |
| Total Current Liabilities | | 351783 |
| Non-current Liabilities | | |
| Provision for long service leave | | 290 080 |
| Total Liabilities | | 641 863 |
| Total Elabilities | | |
| | | |
| AS AT 20 HINE 1985 | | 693 988 |
| AS AT 50 JUNE 1905 | | |
| | | |
| * Fixed Assets were assessed as follows: | | |
| Total historic value of assets as at 30.6.85 | 1 279 755 | |
| Less depreciation to 30.6.85 | 290 113 | |
| Total net written down value at 30.6.85 | 989 642 | |
| Plus asset creditors at 30.6.85 | 91 | |
| Total Fixed Assets at 30.6.85 | 989733 | |
| 10(u) 11/cu /155cl5 ut 5010.05 | | |

13. CAPITAL COMMITMENTS

As part of the day-to-day management initial capital works program, Q.NPWS entered into a contract in 1985-86 for the purchase of a vessel valued at \$191320 ownership of which will vest in the Authority. The Authority made progress payments to Q.NPWS of \$76974 in 1985-86 leaving a balance owing as at 30 June 1986 of \$114346 which will be fully paid in 1986-87.

In 1985-86 the Authority entered into a software contract for a financial management system. As at 30 June 1986 \$7.784 was owing on the contract and is payable in 1986-87 subject to final acceptance.

14. CONTINGENT LIABILITIES

The Authority is unaware of any contingent liability existing as at 30 June 1986.

15. SUPERANNUATION

As staff of the Authority are employed under the Public Service Act it has no obligation in respect of employer contributions to the Commonwealth Superannuation Scheme.

16. RESOURCES PROVIDED FREE OF CHARGE TO THE AUTHORITY

The following resources were provided free of charge to the Authority and accordingly are not reflected as expenses in the Statement of Activity:

- (a) Commonwealth Work Experience Program \$12 440. Staff employed by the Authority under this scheme are paid for by the Department of Employment and Industrial Relations.
- (b) Training For Aboriginals Program \$4756. Staff employed by the Authority under this scheme are paid for by the Department of Employment and Industrial Relations.
- (c) External audit services the Auditor-General audits the accounts of the Authority without charge. It is not practicable for the Authority to estimate these costs.
- (d) Coastal Surveillance \$401158. The share of these costs attributable to the Great Barrier Reef Region are met by the Department of Arts, Heritage and Environment. The Authority receives free of charge reports on aerial surveillance operations within the Great Barrier Reef Region.

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17. OPERATING LEASES

The aggregate amount of operating leases contracted for and outstanding as at 30 June 1986 is \$389 113. These leases are for a photocopier (\$4542) and office accommodation (\$384 571). The discharge of these lease commitments will be:

| | ₽ |
|------------------------------------|---------|
| Within one year | 162 810 |
| n the second year | 155 392 |
| Within a three to five year period | 70 911 |
| | 389 113 |

18.

NATIONAL PARKS AND WILDLIFE SERVICE GREAT BARRIER REEF MARINE PARK STATEMENT OF RECEIPTS AND PAYMENTS FOR THE YEAR ENDED 30TH JUNE, 1986

| 1984-85 | | | 1985-86 | |
|--|---|--------------------------------|-----------|----------|
| \$ | | \$ | \$ | \$ |
| | The balance at 1st July comprised — | | | |
| 58,957 | Recurrent Costs | | 73,279 | |
| 125,887 | Capital Works and Services | | 137,694 | |
| | Disposal of Motor Vehicles | | 12,300 | |
| | | | | 223,273 |
| | Receipts for the year were - | | | |
| 1,219.000 | For Recurrent Costs | 1.433.072 | | |
| 373,000 | For Capital Works and Services | 352.893 | | |
| 12,300 | Disposal of Motor Vehicles | 5,850 | | |
| | Total Receipts (Note 1) | Section and the section of the | 1 701 915 | |
| | Against which the following payments were made — | | 1,791,015 | |
| 539 101 | Salaries Wages Superannuation and Payroll Tax | 825 852 | | |
| 665.577 | Operating Costs (Note 2) | 728 786 | | |
| 361,193 | Capital Works and Services (Note 3) | 442 792 | | |
| | To GBRMPA for vehicles sold | 18,150 | | |
| | Total Paumente | | 2 015 500 | |
| | Total Payments | | 2,015,500 | |
| * 38,429 | Resulting in an excess of payments over receipts of | | | 223,765 |
| | Leaving a balance at 30th June comprising — | | | |
| 73,279 | Recurrent Costs | | (48,287) | |
| 137,694 | Capital Works and Services | | 47,795 | |
| 12,300 | Disposal of Motor Vehicles | | | |
| \$ 223,273 | | | | \$ (492) |
| CONTRACTOR CONTRACTOR CONTRACTOR CONTRACTOR OF | | | | |

* Excess receipts

NOTES TO AND FORMING PART OF THE ACCOUNTS

(A) Statement of Accounting Policies

(a) Basis of Accounts

The accounts have been prepared on a cash basis, consistent with the basis applied in the previous financial year.

(B) Statement of Significant Items Outside the Ambit of the Statement

- 1. Current Assets/Liabilities
- Current assets and liabilities stood at a normal level at the beginning and end of the year.
- 2. Contingent Assets/Liabilities
- There were no known contingent assets or liabilities of a significant nature at 30th June, 1986.
- 3. Statement of Capital Assets (At Cost) as at 30th June, 1986.

| | Funded by | | Funded by | |
|---|--------------|-------------|------------------|----------|
| | Commonwealth | | Queensland | |
| | (cumula | ative from | (cumulative from | |
| | 1st Ju | ly, 1981) | 1st July | , 1981) |
| | 1984-85 | 1985-86 | 1984-85 | 1985-86 |
| | \$ | \$ | \$ | \$ |
| Vessels and associated equipment | 126,169 | 232,647 | 7,986 | 25,678 |
| Vehicles* | 103,033 | 116,576 | 8,563 | 17,997 |
| Diving equipment | 39,058 | 42,339 | _ | _ |
| Audio-visual and interpretation equipment | 55,569 | 76,635 | _ | 6,716 |
| Air Compressor | 3,496 | 5,646 | - | 2,150 |
| Plant and equipment | 78,510 | 110,885 | 12,300 | 17,799 |
| Moorings | 2,083 | 2,083 | | <u> </u> |
| Building lease | 13,000 | 13,000 | <u> </u> | |
| Monitoring facilities | 9,669 | 9,669 | | |
| Accommodation, storage shed and workshop | | | | |
| - Heron Island | 224,653 | 224,655 | <u> </u> | _ |
| Interpretative building — Heron Island | 4,731 | 166,324 | — | |
| Office accommodation — Cairns | 93,644 | 116,893 | <u> </u> | - |
| Flinders Island — base equipment | | 29,025 | | |
| | \$753,615 | \$1,146,377 | \$28,849 | \$70,340 |

* The cumulative figures for Commonwealth funded vehicles in 1984-85 and 1985-86 have been reduced by \$15,051 and \$8,539 respectively. These amounts are the cost price of vehicles disposed of during these years.

Stocktakes were carried out by officers of the Queensland National Parks and Wildlife Service and equipment on hand balanced with official equipment cards.

(C) Explanatory notes

| | 1984-85 \$ | 1985-86 \$ |
|--|---------------|---------------|
| Note 1. Receipts during the year were provided from the following sources: | | |
| Commonwealth Government: | | |
| Recurrent Costs 50% | 609,500 | 716,536 |
| Capital Works and Services: | | |
| Initial Program 100% | 343,000 | 285,965 |
| Post-Initial Program 50% | 15,000 | 33,464 |
| | 967,500 | 1,035,965 |
| Queensland Government: | | |
| Recurrent Costs 50% | 609,500 | 716,536 |
| Capital Works and Services: | | |
| Post-Initial Program 50% | 15,000 | 33,464 |
| | 624,500 | 750,000 |
| Disposal of Motor Vehicles: | | |
| Funded 100% by Commonwealth | 12,300 | 5,850 |
| | \$1,604,300 | \$1,791,815 |

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| | 1984-85 | 1985-86 |
|---|-----------|-----------|
| | \$ | \$ |
| Note 2. Operating Costs | | |
| Air travel and fares | 35,692 | 42,239 |
| Travel allowance | 41,250 | 54,643 |
| Vessel charter | 23,719 | 71,580 |
| Air surveillance and charter | 109,863 | 142,435 |
| Vessel running expenses | 39,215 | 37,935 |
| Motor vehicle running expenses | 21,548 | 36,397 |
| Office supplies | 18,505 | 16,722 |
| Appointment expenses | 21,063 | |
| Rates, services and rental | 82,011 | 63,234 |
| Photocopy and printing | 6.970 | 3.824 |
| Library | 4,712 | 7,997 |
| Conferences and training | 11.145 | 1.397 |
| General operating expenses | 82.578 | 33,996 |
| Monitoring | 9.953 | _ |
| Photographic materials and processing | 21,268 | 12.171 |
| Furniture and fittings | 91,546 | 24.807 |
| Professional fees | 17.378 | 5,383 |
| Uniforms | 1,745 | 1.670 |
| Building maintenance | 4,902 | 7.009 |
| Day labour | 20,514 | 68,761 |
| Equipment maintenance and running | | 9,491 |
| Communication expenses | | 36.304 |
| Material and project requisites | | 50,791 |
| | \$CCE E77 | 6700 700 |
| | | \$/28,/86 |
| | 1094 95 | 1005 00 |
| | 1984-85 | 1985-86 |
| Nets 2. Constal Wester and Constant | > | \$ |
| Note 3. Capital works and Services | | |
| — Initial Program | | |
| Vessels and associated equipment | 62,407 | 91,467 |
| Vehicles | 68,914 | 13,247 |
| Diving equipment | 20,139 | 3,281 |
| Audio-visual and interpretation equipment | 23,549 | 14,351 |
| Plant and equipment | 58,023 | 26,995 |
| Monitoring facilities | 1,105 | _ |
| Interpretive building — Heron Island | 4,731 | 161,593 |
| Office accommodation — Cairns | 93,644 | 23,249 |
| Flinders Island — base equipment | | 29,025 |
| | \$332,512 | \$363,208 |
| | | |
| — Post-Initial Program | | |
| Vessels and associated equipment | 8,721 | 32,703 |
| Vehicles | | 18,269 |
| Plant and equipment | 19,960 | 28,612 |
| | \$ 28 681 | \$ 79 584 |
| | | |
| | | |
| | \$361,193 | \$442,792 |

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We certify that, in our opinion, the foregoing Statement of Receipts and Payments and appended notes fairly set out the financial transactions of the Great Barrier Reef Marine Park for the period 1st July, 1985 to 30th June, 1986 and show a true and fair view of the state of affairs at 30th June, 1986 on a basis consistent with that applied in respect of the financial year last preceding. The receipt and expenditure of moneys were in accordance with the approved programs and in accordance with draft agreements and agreements executed between the Commonwealth and Queensland Governments with regard to day to day management and control and ownership of assets.

J. G. Hows Accountant Queensland National Parks and Wildlife Service G. W. Saunders Director Queensland National Parks and Wildlife Service

I have examined the accounts of the Queensland National Parks and Wildlife Service in relation to the Great Barrier Reef Marine Park and I have obtained all the information and explanations that I have required. In my opinion the foregoing Statement of Receipts and Payments and appended notes;

- (a) are in the form indicated in the prescribed requirements;
- (b) are in agreement with the accounts; and
- (c) have been properly drawn up so as to present a true and fair view of the transactions for the financial year ended 30th June, 1986 and the financial position at 30th June, 1986 on a basis consistent with that applied in respect of the financial year last preceding.

V. C. Doyle Auditor-General of Queensland

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APPENDIX F AUDITOR-GENERAL'S REPORT

2 December 1986

The Honourable the Minister for Arts, Heritage and Environment Parliament House CANBERRA ACT 2600

Dear Minister

GREAT BARRIER REEF MARINE PARK AUTHORITY AUDIT REPORT ON FINANCIAL STATEMENTS

Pursuant to sub-section 60(2) of the Great Barrier Reef Marine Park Act 1975, the Great Barrier Reef Marine Park Authority has submitted for audit report its financial statements for the year ended 30 June 1986. These comprise a Statement of Activity, Statement of Assets and Liabilities, Statement of Capital Accumulation, Statement of Sources and Applications of Funds, and accompanying notes to and forming part of the financial statements.

The Statements have been prepared in accordance with the policies outlined in Note 2 to the Accounts and in accordance with the Guidelines for the Form and Standard of Financial Statements of Commonwealth Undertakings approved by the Minister for Finance. The Statements are in the form approved by the Minister for Finance pursuant to sub-section 60(1) of the Act. A copy of the financial statements is enclosed for your information.

These statements have been audited in conformance with the Australian Audit Office Auditing Standards.

In accordance with sub-section 60(2) of the Act, I now report that the statements are in agreement with the accounts and records of the Authority and, in my opinion —

- the statements are based on proper accounts and records, and
- subject to finalisation of formal agreement between the Commonwealth and Queensland governments for day-to-day management and control and ownership of assets, the receipt and expenditure of moneys, and the acquisition and disposal of assets by the Authority during the year, have been in accordance with the Act.

Yours sincerely

Lette

P.L. Lidbetter First Assistant Auditor-General

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APPENDIX G MEMBERS OF ADVISORY COMMITTEES

Crown of Thorns Starfish Advisory Review Committee (COTSARC)

Professor John Swan (Chairman) Immediate past Chairman of the Australian Marine Science and Technology Advisory Committee (AMSTAC) Dr J. T. Baker, OBE Director, Australian Institute of Marine Science Dr C. Birkeland Marine Laboratory, University of Guam Professor R. Carter Geology Department, James Cook University of North Queensland Associate Professor R. Endean Zoology Department, University of Queensland Mrs P. Havles Marketing Servicing Manager, Hayles Magnetic Island Pty Ltd (representing the tourist industry) Dr T. Hundloe Director, Institute of Applied Environmental Research, Griffith University Dr R. A. Hynes Director, Central Section, Queensland National Parks and Wildlife Service Mr G. Kelleher Chairman, Great Barrier Reef Marine Park Authority Dr J. Lucas Zoology Department, James Cook University of North Queensland Mr R. Pearson Director, Fisheries Research Branch, Queensland Department of Primary Industries Senator Margaret Reynolds (representing Queensland in the Australian Senate) Professor K. P. Stark Chairman, Department of Civil and Systems Engineering, James Cook University of North Queensland Associate Professor P. Sale School of Biological Sciences, University of Sydney Professor M. Yamaguchi Department of Marine Sciences, University of the Ryukyus, Japan

Members of Advisory Committees 105

Great Barrier Reef Wonderland Aquarium Advisory Committee

Mr G. Kelleher (Chairman) Chairman, Great Barrier Reef Marine Park Authority Dr W. Adey Director, Marine Systems Laboratory, Smithsonian Institution, Washington, DC, USA Dr J. T. Baker, OBE

Director, Australian Institute of Marine Science

Dr B. Chalker

Australian Institute of Marine Science

Mr I. M. Dutton

Great Barrier Reef Marine Park Authority

Mr U. E. Friese

Director of Animal Facilities, Faculty of Medicine, University of New South Wales

Dr J. Glazebrook

School of Tropical Veterinary Science, James Cook University of North Queensland

Associate Professor D. Hopley

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

Mr P. Hunnam

Queensland National Parks and Wildlife Service

Mr G. Morris

Director, Healesville Sanctuary, Victoria

Dr P Pearce

Department of Behavioural Sciences, James Cook University of North Queensland

Associate Professor M. Pichon

Department of Marine Biology, James Cook University of North Queensland

Professor Kevin Stark

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

Mr C. Still

Special Projects Office, Government Architect's Office, NSW

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