



THE GREAT BARRIER REEF MARINE PARK AUTHORITY



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

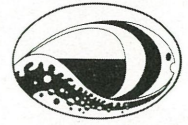
NOT
FOR
LOAN

ANNUAL REPORT 1982/83

Green Island Reef. This major Great Barrier Reef tourist destination, has been a Queensland Marine Park since 1937 and was included in the Great Barrier Reef Marine Park in 1981.

Sally Dring

**THE GREAT BARRIER REEF
MARINE PARK AUTHORITY**



**ANNUAL REPORT
1982/83**

GREAT BARRIER REEF MARINE PARK





Ours to use wisely

PHOTO CREDITS:

Pages viii and 19
Photography courtesy of
Ron and Valerie Taylor.

Page 127
Photography courtesy of
Julie Johnson.

Pages ii and iii
Photography by
Ray Berkelmans.

Page 56
Photography by
Nev Collins.

LETTER TO THE MINISTER

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

7 November 1983

Dear Minister,

In accordance with Section 60 of the *Great Barrier Reef Marine Park Act* 1975, I submit the Seventh Annual Report of the Great Barrier Reef Marine Park Authority on the operations of the Authority for the year that ended 30 June 1983.

Yours sincerely,



Graeme Kelleher
Chairman

The Hon. Barry Cohen, M.P.,
Minister for Home Affairs and Environment,
Parliament House,
CANBERRA, A.C.T. 2600

TABLE OF CONTENTS

FROM THE CHAIRMAN	1
THE GREAT BARRIER REEF MARINE PARK AUTHORITY	3
THE GREAT BARRIER REEF MINISTERIAL COUNCIL	7
THE GREAT BARRIER REEF CONSULTATIVE COMMITTEE	9
THE YEAR IN REVIEW	12
PLANNING	15
PARK MANAGEMENT	23
EDUCATION AND INFORMATION	37

RESEARCH AND MONITORING 45

ADMINISTRATION 51

APPENDIXES 55

A. Executive Staff 57

B. Publications Available 58

**C. Reports on Research Funded During
1982/83 61**

D. Financial Statements 121

E. Auditor-General's Report 126



Snorkelling at Heron Island Reef.

FROM THE CHAIRMAN

The Great Barrier Reef Region covers an area of almost 350 000 square kilometres. It is considerably larger in area than the United Kingdom or the State of Victoria. The area has been used by Aborigines from time immemorial and the extent and intensity of its use has increased progressively since Europeans first settled in Australia. Such usage continues to increase at ever higher rates. In response to these pressures, various mechanisms for monitoring and regulating human activities in the Great Barrier Reef area and its islands have been developed over time. When the Great Barrier Reef Marine Park Act was passed in 1975 by both Houses of Commonwealth Parliament, with the support of all parties, there already existed a complex set of mechanisms which regulated human activity on and near the Great Barrier Reef. These included State and Commonwealth regulations on fishing, mineral exploration and recovery, boating and shipping, tourist operations, operations of ports and harbours and the discharge of wastes from fixed installations and vessels. The Great Barrier Reef Marine Park Act provides, in effect, that regulations made under it over-ride conflicting provisions in other Commonwealth or State legislation except in relation to the regulation of navigation of vessels or the flying of aircraft in the Marine Park.

The proportion of the Great Barrier Reef Region which is within the Marine Park, as of June 1983, is 14%. During the year, the Authority reported to the Minister regarding declaration of three further sections which would bring the proportion of the Region in the Marine Park up to 80%. It received a direction from the Minister to report on the remaining 20% of the Region before the end of September, 1983.

The over-riding nature of regulations made under the Act, and the potential extent of application of these regulations, in both geographical and social terms, places a great responsibility on the Authority and its staff to act with care, competence and regard for the rights of people and organisations who use or have responsibilities in relation to the Reef. It is not a responsibility that we take lightly. Commensurate with meeting the conservational and preservational objectives set out in the Act, which require, we believe, provision for the wise use and enjoyment of the Great Barrier Reef in perpetuity, we minimize interfering with existing management mechanisms or with existing human activities. We rely to the maximum extent practicable on co-operation with other organisations and the utilisation of their technical and human resources.

The further development during the year of co-operation with the Queensland National Parks and Wildlife Service and other Queensland agencies, in the establishment, control, care and development of the Great Barrier Reef Marine Park and adjacent areas, has been a source of great satisfaction. The Queensland National Parks and Wildlife Service is responsible for day-to-day management of the

Capricornia Section. The Service works closely with the Authority in all aspects of management and is involved as well in the formulation of policies and programs for the Marine Park. It has also been given responsibility, under the *Queensland Marine Parks Act, 1982*, for the day-to-day management of marine parks in the area between high and low water marks, and is also responsible for management of the island national parks. We are sure that the public will support and benefit from this co-operation between different levels and branches of Government. We believe that the long term success of the Marine Park program depends on the continuation of this approach.

The Capricornia Section has now been in operation for nearly two years. The level of public support for and conformity with this Zoning Plan, has been very pleasing. No major deficiencies in that plan have been identified or objections made to its provisions.

During the year, the Authority submitted to the Minister zoning plans for the Cairns and Cormorant Pass Sections. These zoning plans now lie before both Houses of Commonwealth Parliament. We hope that they will come into effect before the end of 1983. The Cairns Section is huge. It is physically and biologically complex and is subject to a wide spectrum of human uses. Development of its zoning plan, during which all the submissions of experts and the general community were taken carefully into account, was correspondingly difficult. The creation of a new Marine National Park Buffer Zone in which the only fishing activity permitted is trolling from moving vessels was necessary in order to provide protection for many reefs while avoiding unnecessary restrictions on fishing activity, which is an important component of human use of the Great Barrier Reef.

We believe that the development of the Great Barrier Reef Marine Park exemplifies the principles of the World Conservation Strategy, the objectives of which are:

- to maintain essential ecological processes and life-support systems;
- to preserve genetic diversity;
- to ensure the sustainable utilisation of species and ecosystems.'

The Authority's workload is increasing rapidly. Additional resources are being provided to it and I am confident that the enthusiasm and competence of its staff will ensure that the Great Barrier Reef Marine Park will continue to be seen internationally as a model for integrating development and conservation of the marine environment.

THE GREAT BARRIER REEF MARINE PARK AUTHORITY

ESTABLISHMENT BY THE GREAT BARRIER REEF MARINE PARK ACT 1975

The Great Barrier Reef Marine Park Authority (the Authority), which was established under the *Great Barrier Reef Marine Park Act 1975* (the 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 are defined in Section 7 of the Act 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;*
- (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 Authority began operations in 1976. Following the agreement of 14 June 1979 between the then Prime Minister and the Premier of Queensland on constitutional and jurisdictional issues, a 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 and local authorities and the public.

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 maintain a presence 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.

OPERATIONAL STRUCTURE AND LINES OF CONTROL

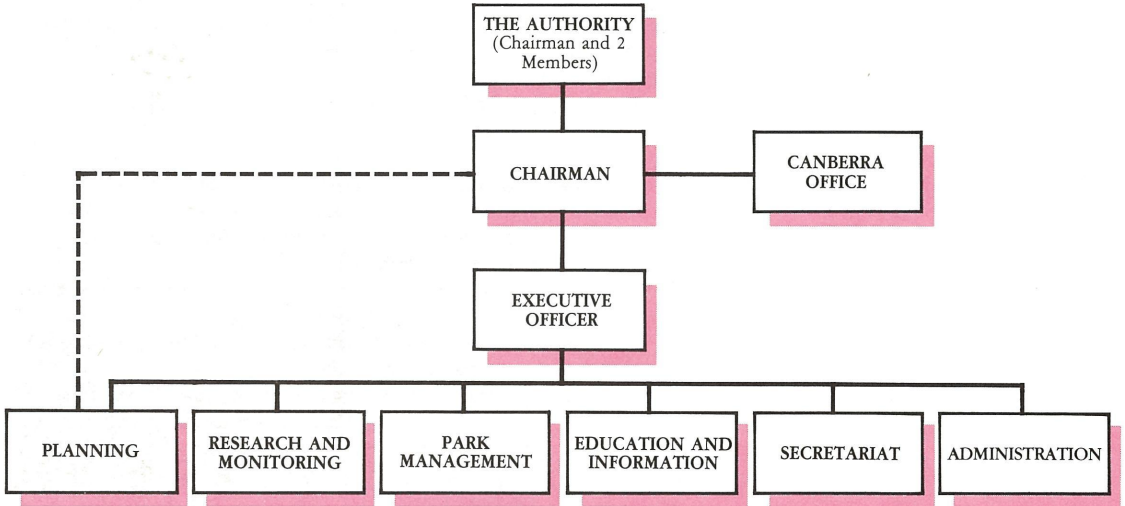


Figure 1

MEMBERSHIP

The full-time Chairman of the Authority is Mr Graeme Kelleher, who was appointed on 21 December 1979 for a period of five years. 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, non-proliferation of nuclear weapons and land use in the Alligator Rivers Region of the Northern Territory. Mr Kelleher has also served as First Assistant Secretary of the Water and Soils Resources Division in the Department of Environment, and as an Examiner of New Zealand's Environment policies for the international Organization for Economic Co-operation and Development (OECD).

Mr Syd Schubert, the Co-ordinator-General for Queensland, was nominated by the Queensland Government as one of the two part-time members. The Co-ordinator-General, inter alia, discharges significant functions in relation to the administration of the *Queensland Marine Parks Act 1982*. Mr Schubert has for many years had primary responsibility for advising the Queensland



Dr. Joe Baker, O.B.E., Mr. Syd Schubert and Mr. Graeme Kelleher.

Government on natural resources development and management and for implementing that Government's policies in such areas. Mr Schubert's current five-year term expires on 30 June 1986.

Dr Joe Baker, O.B.E. is the other part-time member. Dr Baker is Director of the Sir George Fisher Centre for Tropical Marine Studies at James Cook University of North Queensland. Dr Baker 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 1982/83, the Authority held the following meetings:

DATE	LOCATION
1982	
4-5 August	Brisbane
8-9 September	Green Island
28 September	Brisbane
26 October	Canberra
6 November	Heron Island
6/8 December	Brisbane, Townsville
1983	
27 January	Townsville
22 February	Brisbane
28 February	Brisbane
22 March	Brisbane
5 May	Dunk Island
7 June	Hayman Island

THE MINISTER

During the year under review, the Minister for Home Affairs and Environment exercised portfolio responsibilities for Great Barrier Reef matters.

The Hon. Tom McVeigh, M.P. was the Minister until 11 March 1983 when the Hon. Barry Cohen, M.P. was appointed.

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'*.

On 24 May 1983 the Minister directed the Authority to produce, within four months, reports within the meaning of sub-section 31(5) of the Act, on that part of the Great Barrier Reef Region (the Region) south of the Cairns Section of the Great Barrier Reef Marine Park (the Marine Park) which had not already been the subject of a report or reports within the meaning of sub-section 31(5) of the Act. Such reports are pre-requisite to declaration of sections of the Marine Park.

THE GREAT BARRIER REEF MINISTERIAL COUNCIL

The Great Barrier Reef Ministerial Council (the Council) was established in June 1979 to co-ordinate policy between the Commonwealth and Queensland Governments at a Ministerial level. The Council comprises two Ministers from each Government.

SIXTH MEETING

The sixth meeting of the Council took place on Heron Island on 5 November 1982. Ministers who attended the meeting were:

- The Hon. Tom McVeigh, M.P., the then Commonwealth Minister for Home Affairs and Environment (Convenor)
- The Hon. David Thomson, M.C., M.P., the then Commonwealth Minister for Science and Technology
- The Hon. Joh Bjelke-Petersen, M.L.A., the Premier of Queensland
- The Hon. Tony Elliott, M.L.A., the Queensland Minister for Tourism, National Parks, Sport and the Arts

At the meeting the Council agreed that:

- declaration of the Marine Park should be accelerated
 - the Authority should be asked to concentrate its investigations for recommending declarations on those off-shore parts of the Whitsunday and Townsville areas which contain significant reefs, but recognised that in the Far North area there are major reefs close inshore
 - it was unnecessary physically to mark the exact boundary of the Marine Park at low water
 - it is desirable that single permits for activities in adjacent or overlapping areas be issued under the joint authority of Commonwealth and State law
 - before any prosecution in relation to an alleged offence in adjacent or overlapping areas be initiated, the Authority, the Co-ordinator-General and the Crown Law authorities of both Governments be consulted
 - proposals for offshore tourist developments within the Region be forwarded initially to the Authority, and that
 - such proposals be examined by a joint Commonwealth/State committee acting under the auspices of the Council and convened by the Authority
 - the joint committee examine such proposals on a case-by-case basis, taking into account relevant Commonwealth and State legislation
 - the joint committee report to the Council
 - the Council then consider the reports and proposals.
-

Following the Commonwealth parliamentary elections in March 1983 the Hon. Barry Cohen, M.P., Minister for Home Affairs and Environment (as Convenor), and the Hon. John Brown, M.P., Minister for Sport, Recreation and Tourism, were appointed as the Commonwealth Ministers on the Council.

SEVENTH MEETING

The seventh meeting of the Council took place in Townsville on 3 June 1983. Ministers who attended the meeting were:

- The Hon. Barry Cohen, M.P., the Commonwealth Minister for Home Affairs and Environment (Convenor)
- The Hon. John Brown, M.P., the Commonwealth Minister for Sport, Recreation and Tourism
- The Hon. Joh Bjelke-Petersen, M.L.A., the Premier of Queensland
- The Hon. Tony Elliott, M.L.A., the Queensland Minister for Tourism, National Parks, Sport and the Arts

At the meeting the Council:

- reviewed previous agreements between the Commonwealth and Queensland Governments on co-ordination of policies and co-operative arrangements in respect of the Great Barrier Reef, and determined that these agreements provided a sound basis for the protection and management of the Reef, land and waters in the Region
 - agreed that the principles of these agreements should be embodied in a document to be signed by both Governments, and that they would apply to all sections of the Marine Park, subject to annual review of expenditure
 - agreed to explore the possibility of producing a film to explain the Marine Park concept and help the public enjoy the Marine Park in ways that do not damage it
 - endorsed Three-Year Rolling Programs for the Capricornia, Cairns and Cormorant Pass Sections of the Marine Park in respect of 1983/84 — 1985/86
 - reaffirmed earlier statements on the desirability of adopting complementary management regimes and agreed that to avoid public confusion there should be very close consultation between the Queensland Government and the Authority in the application of Queensland legislation
 - agreed that structures on the Reef should meet environmental standards and have the approval of both Governments
 - noted that the Authority had been directed to provide reports on the remaining inshore areas of the Region not later than September 1983, and agreed to meet again in late October 1983, to discuss these reports.
-

THE GREAT BARRIER REEF CONSULTATIVE COMMITTEE

The Great Barrier Reef Consultative Committee (the Consultative Committee) was established under the Act. Its functions are to advise the Commonwealth Minister for Home Affairs and Environment on matters relating to the operation of the Act and to advise the Authority on Marine Park matters 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. Administrative and secretariat support for the Consultative Committee is provided by staff of the Authority.

Appointments for all members of the previous Consultative Committee except Mr Kelleher and Dr Bunt expired on 3 October 1982. Dr Bunt was reappointed on 24 September 1981 for a further term of three years. Mr Kelleher is an Authority appointee with an indefinite term.

MEMBERSHIP TO 3 OCTOBER 1982:

- Professor K.P. Stark (Chairman)
James Cook University of North Queensland
- Mr J.D. Ballingall
Queensland Commercial Fishermen's State Council
- Dr J.S. Bunt
Australian Institute of Marine Science
- Dr D.W. Connell
Australian Conservation Foundation
- Mr P.B. Eccles
Commonwealth Department of Transport and Construction
- Mr D.J. Fraser
Commonwealth Department of Industry and Commerce
- Mr E.J. Hegerl
Queensland Conservation Council and Australian Littoral Society
- Mr J.H. Izatt
Queensland Game Fishing Association
- Mr G.G. Kelleher
Great Barrier Reef Marine Park Authority
- Dr P. Mather
Great Barrier Reef Committee
- Mr G. McKauge
Reef Region Tourism Task Force
- Dr P. Saenger
Queensland Amateur Fishing Council
- Dr G.W. Saunders
Queensland National Parks and Wildlife Service

-
- Mr K.E. Thompson
Commonwealth Department of Home Affairs
and Environment
 - Mr J.T. Woods
Queensland Department of Mines

On 1 October 1982, the then Minister for Home Affairs and Environment appointed fourteen members for the period of three years commencing 4 October 1982. The Commonwealth and Queensland Governments each nominated seven members. With Mr Kelleher and Dr Bunt, the Consultative Committee now comprises sixteen members.

NEW MEMBERS OF THE CONSULTATIVE COMMITTEE ARE:

- Dr R.A. Bain
Commonwealth Department of Primary Industry
- Mr D.F. Bryan
Queensland Commercial Fishermen's State Council
- Mr E.M. Grant
Queensland Department of Harbours and Marine
- Mr T.J. Hundloe
Australian Conservation Foundation
- Mr P.T. King
Queensland Tourist and Travel Corporation
- Mr K.J. Nielson
Commonwealth Department of Sport, Recreation and Tourism.

RETIRING MEMBERS WHO WERE REAPPOINTED ARE:

- Mr P.B. Eccles
Commonwealth Department of Transport
- Mr E.J. Hegerl
Australian Littoral Society
- Mr J.H. Izatt
Queensland Game Fishing Association
- Dr P. Mather
Great Barrier Reef Committee
- Mr G. McKauge
Far North Queensland Promotions Bureau
Tourism Task Force
- Dr P. Saenger
Australian Underwater Federation and
Queensland Amateur Fishing Council
- Dr G.W. Saunders
Queensland National Parks and Wildlife Service
- Professor K.P. Stark
James Cook University of North Queensland.

Professor Stark was elected Chairman by the new Consultative Committee.

The Consultative Committee met four times in 1982/83; once in Canberra, twice in Townsville, and once at Hayman Island. Two of the meetings were held in conjunction with meetings of the Authority. At the Canberra meeting, members met senior officials from Commonwealth Departments with interests in the Region. One meeting in Townsville included a visit to the Australian Institute of Marine Science.

On 9 June 1981, the Minister requested the Consultative Committee, in accordance with S.21(1)(a) of the Act, to furnish a critique on all processes involved in the establishment and management of the Capricornia Section of the Marine Park. The Minister suggested that the Consultative Committee await implementation of day-to-day management arrangements before proceeding with its detailed consideration.

The critique submitted to the Minister in October 1982 was in the form of twenty-two conclusions that the Consultative Committee had reached after considering reports and member's responses to a questionnaire. The conclusions reflected the Consultative Committee's general agreement with the processes involved in the zoning and management of the Capricornia Section of the Marine Park.

At its first two meetings of the year, the Consultative Committee reviewed progress reports on day-to-day management of the Capricornia Section. These meetings also gave special attention to draft zoning plans for the Cairns and Cormorant Pass Sections. At its meeting in January 1983, the Consultative Committee considered the proposed boundaries for future sections of the Marine Park. The meeting recommended to the Authority that remaining areas in the far north, central and southern parts be added to the existing Cairns, Cormorant Pass and Capricornia Sections as soon as practicable in order that the whole Great Barrier Reef be included in the Marine Park.

Other matters considered during the year included Great Barrier Reef research, the *Queensland Marine Parks Act* 1982, Australia's Bicentenary, and the *Freedom of Information Act* 1982.

THE YEAR IN REVIEW

7 September 1982 The Minister for Home Affairs and Environment announced the presentation for public review of the draft zoning plans for the Cairns and Cormorant Pass Sections of the Marine Park.

27 September 1982 The Australian Heritage Commission placed the Great Barrier Reef Region and islands on the Register of the National Estate.

5 October 1982 The Minister for Home Affairs and Environment announced the new membership of the Great Barrier Reef Consultative Committee.

5 November 1982 The sixth meeting of the Great Barrier Reef Ministerial Council was held on Heron Island.

7 December 1982 Closing date for receipt of public representations on the draft zoning plans for the Cairns and Cormorant Pass Sections. In response to the Cairns public participation program, 189 representations were received.

5 March 1983 Commonwealth elections.

11 March 1983 The Hon. Barry Cohen, M.P., was appointed Minister for Home Affairs and Environment.

19 April 1983 The Hon. Barry Cohen, M.P., Minister for Home Affairs and Environment and the Hon. John Brown, M.P., Minister for Sport, Recreation and Tourism were appointed to represent the Commonwealth Government on the Ministerial Council.

26 May 1983 Cairns and Cormorant Pass Sections Zoning Plans were tabled in the House of Representatives.

1 June 1983 Cairns and Cormorant Pass Sections Zoning Plans tabled in the Senate.

3 June 1983 The seventh meeting of the Great Barrier Reef Ministerial Council was held in Townsville.



Shucking scallops, Rosslyn Bay.

PLANNING

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

Planning is based on the analysis and synthesis of information on the character, resources and use of the Region as a whole, and of potential and proclaimed sections of the Marine Park in particular. This information is obtained from technical literature, specialist reports prepared by consultants, staff and other public instrumentalities, and from representations made by the public.

ZONING PLANS FOR CAIRNS AND CORMORANT PASS SECTIONS

Zoning plans are intended to promote both conservation and reasonable use of the resources of the Marine Park. As provided in the Act, the public is encouraged to participate in the major planning stages.

In the first stage of planning the Cairns and Cormorant Pass Sections, an inventory was made of their resources and uses. The public was invited to provide information on the uses and characteristics of the Sections, to express any related concerns and interests and to make recommendations for zoning and management. By July 1982, two hundred and two responses had been received, some coming from organizations representing an entire industry and others from community interest groups with large membership numbers.

With the aid of the information and recommendations offered by the public, draft zoning plans were prepared for the two Sections. The public, particularly users of the Sections, was invited at this stage to review and comment on the proposed zoning plans. *Zoning the Reef*, an explanatory leaflet that was the basis of the public participation program, reads in part:

LET US KNOW

- If you approve of the plans
- What changes you suggest in the plans
- Alternative zoning to satisfy all user needs — your own and others
- What you like or dislike in the plans
- What information supports your recommendations.

QUEENSLAND

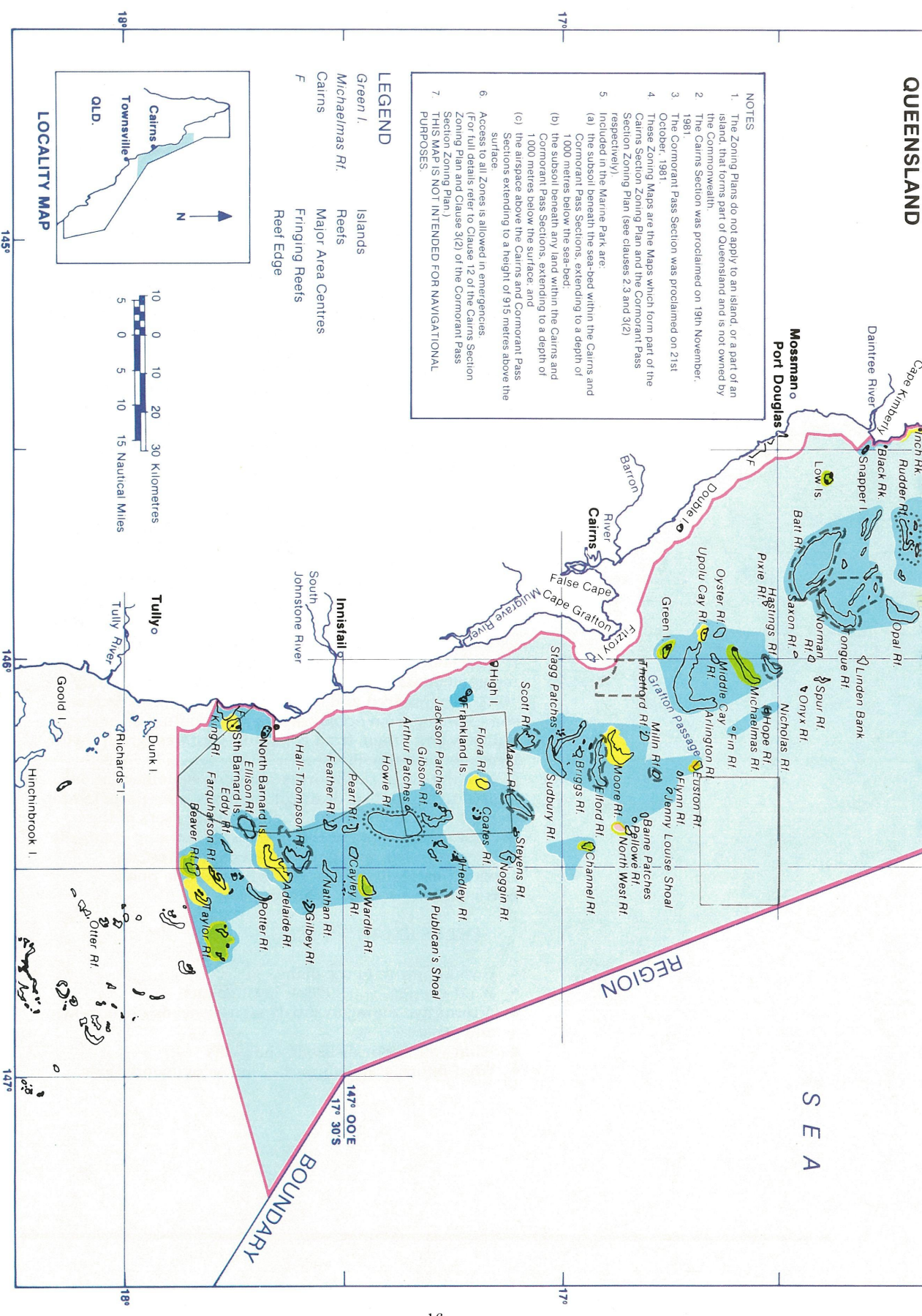
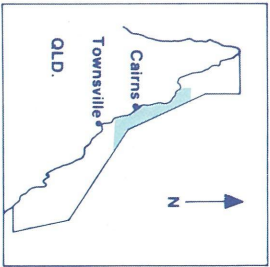
NOTES

1. The Zoning Plans do not apply to an island, or a part of an island, that forms part of Queensland and is not owned by the Commonwealth.
2. The Cairns Section was proclaimed on 19th November, 1981.
3. The Cormorant Pass Section was proclaimed on 21st October, 1981.
4. These Zoning Maps are the Maps which form part of the Cairns Section Zoning Plan and the Cormorant Pass Section Zoning Plan (see clauses 2.3 and 3(2) respectively).
5. Included in the Marine Park are:
 - (a) the subsoil beneath the sea-bed within the Cairns and Cormorant Pass Sections, extending to a depth of 1 000 metres below the sea-bed;
 - (b) the subsoil beneath any land within the Cairns and Cormorant Pass Sections, extending to a depth of 1 000 metres below the surface; and
 - (c) the airspace above the Cairns and Cormorant Pass Sections extending to a height of 915 metres above the surface.
6. Access to all Zones is allowed in emergencies (For full details refer to Clause 12 of the Cairns Section Zoning Plan and Clause 3(2) of the Cormorant Pass Section Zoning Plan).
7. THIS MAP IS NOT INTENDED FOR NAVIGATIONAL PURPOSES.

LEGEND

- | | |
|-----------------|--------------------|
| Green I. | Islands |
| Michaëlmass Rl. | Reefs |
| Cairns | Major Area Centres |
| F | Fringing Reefs |
| | Reef Edge |

LOCALITY MAP



GREAT BARRIER REEF MARINE PARK — ZONING PLANS — ZONING MAP (1)



During this phase, 189 representations, mainly from users, were received. Included were a number of petitions and standardised letters. The main issues were:

1. King Reef/Kurrimine Beach area. Less restrictive zoning was requested to allow recreational fishing of nearshore areas (particularly by locals using small boats), mackerel trolling and spearfishing.
2. Pelagic (open water) fishing. Mackerel and game fishing interests felt discriminated against by Marine National Park 'A' zoning and zoning that would affect taking of bait and trolling at highly rated mackerel and marlin grounds.
3. Trawling. The trawling industry view that the zoning plan excessively restricted its fishing grounds, conflicted with the recreational fishing and conservationist interests, which expressed concern as to the impact of trawling and favoured more protective zoning.
4. Lizard Island area. The view was expressed that research interests conflicted with commercial and recreational fishing interests.
5. Bag limits. Even though bag limits were not proposed in the zoning plans, a number of representations recommended limiting the catch of certain species. Many of those commenting on bag limits suggested this method of management as an alternative to the closing of areas by zoning.

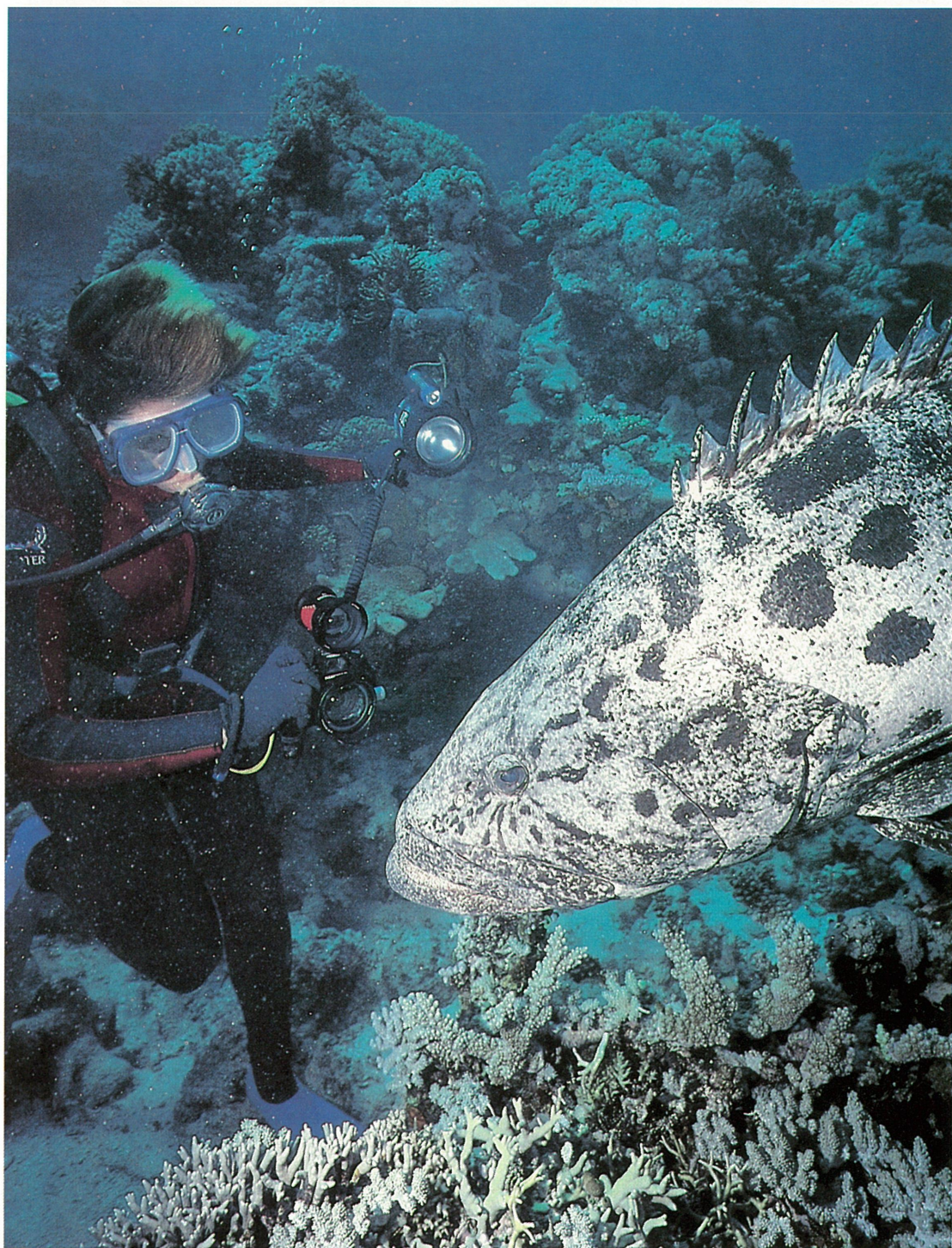
Authority members and staff attended a number of meetings with concerned parties to hear comment on the plans and to discuss means by which conflict could be resolved. The Authority reported the content of these representations to the Minister.

In the light of the public's representations, the Authority made such changes to the zoning plans as it considered appropriate.

In the revised zoning plans the Authority has attempted to achieve an acceptable balance between conservation principles on the one hand and the reasonable requirements of the various user groups on the other.

The revised zoning plans (refer to map pages 16-17) were considered by the Ministerial Council and subsequently submitted by the Authority to the Minister. The plans were tabled on May 26 and June 1 in the House of Representatives and the Senate respectively, where for twenty sitting days they could be the subject of a motion of disallowance in either House.

At the end of the financial year, one sitting day had elapsed. If no motion of disallowance is passed, it is anticipated that the Minister will specify that the zoning plans will come into effect in late 1983.



Photographing potato cod (*Epinephelus tukula*), Cormorant Pass.

DECLARATION OF THE SOUTHERN, CENTRAL AND FAR NORTHERN SECTIONS

In December 1982, the Authority considered the agreement reached at the sixth meeting of the Ministerial Council:

- that the major parts of the three remaining undeclared areas of the Region be simultaneously declared sections of the Marine Park as soon as practicable
- that, in developing reports recommending declaration, the Authority concentrate on those off-shore parts of the Whitsunday and Townsville areas that contain significant reefs
- that the Authority bring forward recommendations for boundaries to the next Ministerial Council in March 1983.

At the close of the year, the reports on declaration of the Southern, Central and Far Northern Sections, were being considered by the Minister.

At the seventh meeting of the Ministerial Council held on 3 June 1983, it was noted that the Authority had been directed to provide reports on the remaining inshore areas of the Region not later than September 1983.

RESEARCH RELEVANT TO PLANNING

Four research projects funded by the Authority and conducted during 1982-83 were of direct relevance to the development of reports recommending declaration and zoning plans.

A map series, at scale 1:250 000, classifying the reefs and islands within the Region, was completed by the Geography Department of James Cook University of North Queensland. It gives the first geomorphological classification coverage of the entire Region, with the number and distribution of the various reef types systematically listed by means of a gazetteer.

The second project was the evaluation of the applicability to Marine Park planning of the computer-based Land Use Planning package (LUPLAN) developed by the CSIRO, Division of Land and Water Resources.

The third project was an inventory/literature review of the history, tenure, characteristics and uses of reefs and islands in the proposed Southern, Central and Far Northern Sections.

The fourth, a co-operative project by two consultants, assessed the work processes of the Authority with a view to preparing computer equipment specification alternatives covering design for the development of a geographic-oriented information and data base management system.

These projects are establishing the basis for a planning information system which can rapidly record and access data on the broad physical, ecological and usage characteristics of every reef of the Region. Such a system will streamline preparation of declaration reports and zoning plans for Marine Park sections, and will simplify monitoring and review of zoning plans.

THE FUTURE

The Planning Section is working to the Authority's recommendation for completion of the Far Northern Section zoning plan by mid 1984, with the zoning plans of the Central and Southern Sections to be completed in the following years. Declaration reports for the proposed Townsville and Inshore Southern Sections are to be completed by September 1983.

The data base management system will be developed in stages over the next few years.



Tourists are transported to Hardy Reef by amphibious aircraft.

PARK MANAGEMENT

Management of the Marine Park is, principally, management of the people who use the Marine Park. The extent to which conservation of the Reef through wise use is achieved depends largely on the effectiveness of management systems and, in particular, on the co-operative interaction of Park users and Park management staff.

The job of Park Management staff is to put into effect the statutory controls set out in the Zoning Plans and regulations in a way that is consistent with the objectives of Marine Park management. To apply successfully these static provisions to a dynamic situation requires guidelines and programs that are responsive to new demands or to variations in usage patterns.

Park management staff also give a public image to management, through such things as buildings and vessels, surveillance systems and education programs.

Management of any park is always more than just the implementation of laws or zoning plans. In fact, the strict application of the law as the sole method of management would be not only prohibitively expensive but also impossible in the Marine Park. Day-to-day management of the Marine Park depends on other methods of implementing the zoning plans and regulations in a publicly acceptable and non-threatening way.

FRAMEWORK FOR MANAGEMENT

Commonwealth/State Agreement

A Basis of Agreement for implementation of the Zoning Plan for the Capricornia Section was endorsed by the Ministerial Council at its third meeting on 1 August 1980. The Basis of Agreement is to be replaced by a formal agreement between the Commonwealth Government, the Queensland Government and the Authority. It will relate to day-to-day management of all sections of the Marine Park, Queensland marine parks and national parks and other areas associated with the Marine Park. The agreement will also provide for programs for interim management of sections of the Marine Park in the period between declaration and the dates on which the initial annual programs for sections become effective.

A separate agreement is also being developed concerning control and ownership of assets acquired with finances provided under agreed cost-sharing arrangements for day-to-day management of the Marine Park.

Programs

Long term planning is done by means of Three-Year Rolling Programs which set out the principal management activities proposed for the three-year period and indicate the expected levels of staffing and expenditure. Annual programs approved by the Authority and endorsed by the Ministerial Council are derived from the current Three-Year Rolling Program. They set out the details of day-to-day management.

The costs of day-to-day management are shared on the basis of agreement between the Commonwealth and Queensland Governments:

- Initial capital works programs are funded wholly by the Commonwealth (to be completed within approximately the first three years)
- Recurrent costs (operational costs and salaries) are shared equally
- Capital costs, after initial capital works programs are completed, and replacement capital items are shared equally.

Projected costs from the Three-Year Rolling Programs for the Capricornia Section and the Cairns and Cormorant Pass Sections in 1983/84 — 1985/86 are shown in Figures 2-5.

Management Guidelines

Guidelines for day-to-day management of the Capricornia Section were developed by the Authority with the assistance of Queensland Government officers. They define management aims and principles and identify the main elements of management as:

- education/interpretation
- surveillance
- enforcement
- monitoring
- resource management planning.

The Zoning Plan and regulations for the Capricornia Section came into effect on 1 July 1981. Interim management was provided by the Queensland National Parks and Wildlife Service (Q.NPWS). Surveillance assistance was provided by Coastwatch (Australian Coastal Surveillance Organisation) surveillance. Management effectively began in late 1982 with the appointment of staff to the Q.NPWS Rockhampton office.

Capricornia Section
1983/84 — 1985/86 THREE YEAR ROLLING PROGRAM
Projected Costs

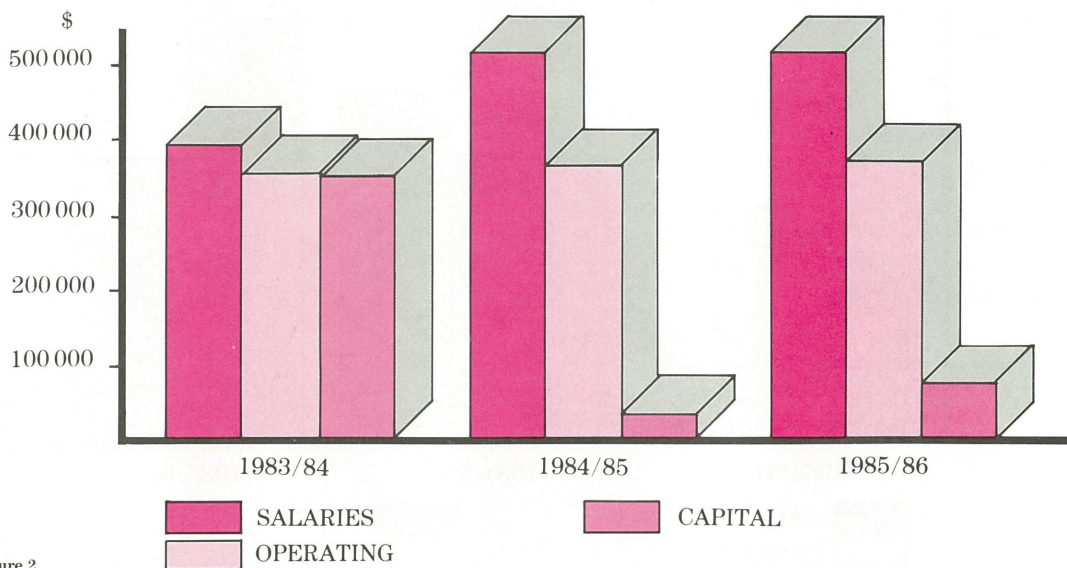


Figure 2

Capricornia Section
1983/84 — 1985/86 THREE YEAR ROLLING PROGRAM
Projected Cost-Sharing

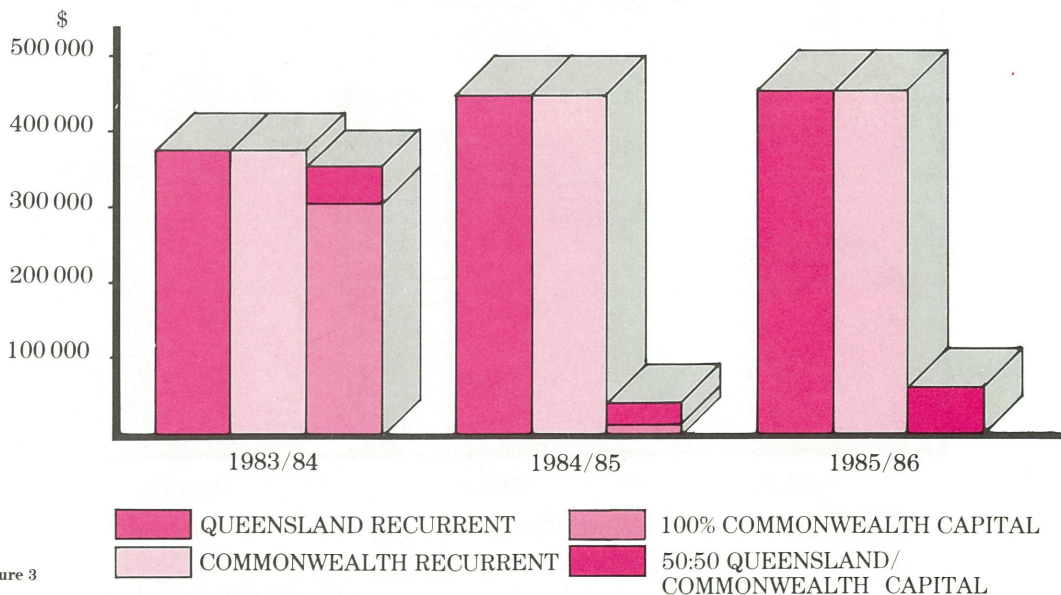


Figure 3

(The Three-year Rolling Program is subject to budget allocation decisions by the Commonwealth and Queensland Governments).

Cairns and Cormorant Pass Sections
1983/84 — 1985/86 THREE YEAR ROLLING PROGRAM

Projected Costs

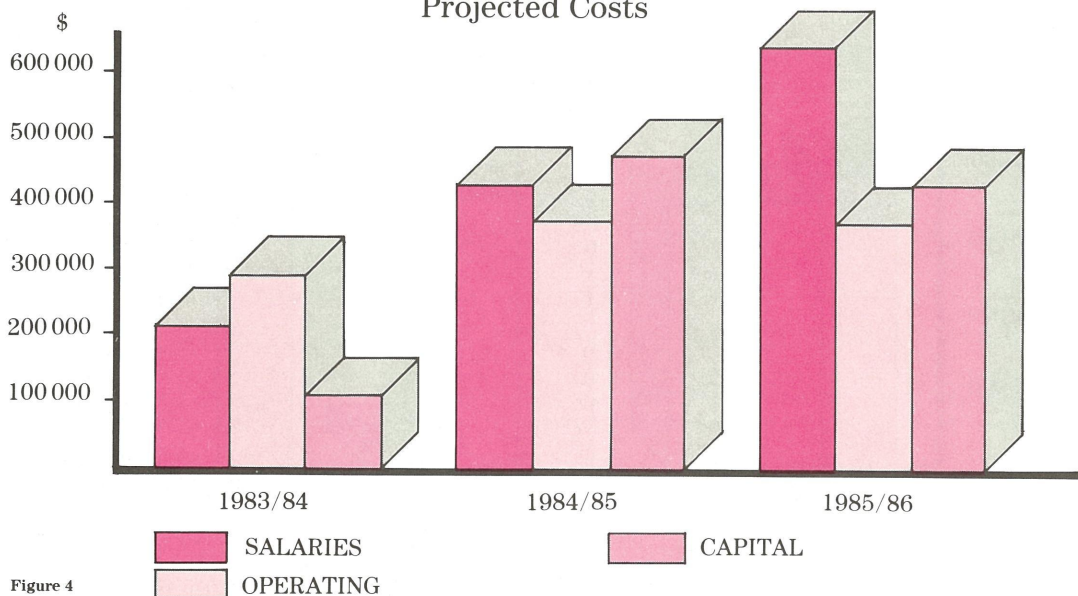


Figure 4

Cairns and Cormorant Pass Sections
1983/84 — 1985/86 THREE YEAR ROLLING PROGRAM

Projected Cost-Sharing

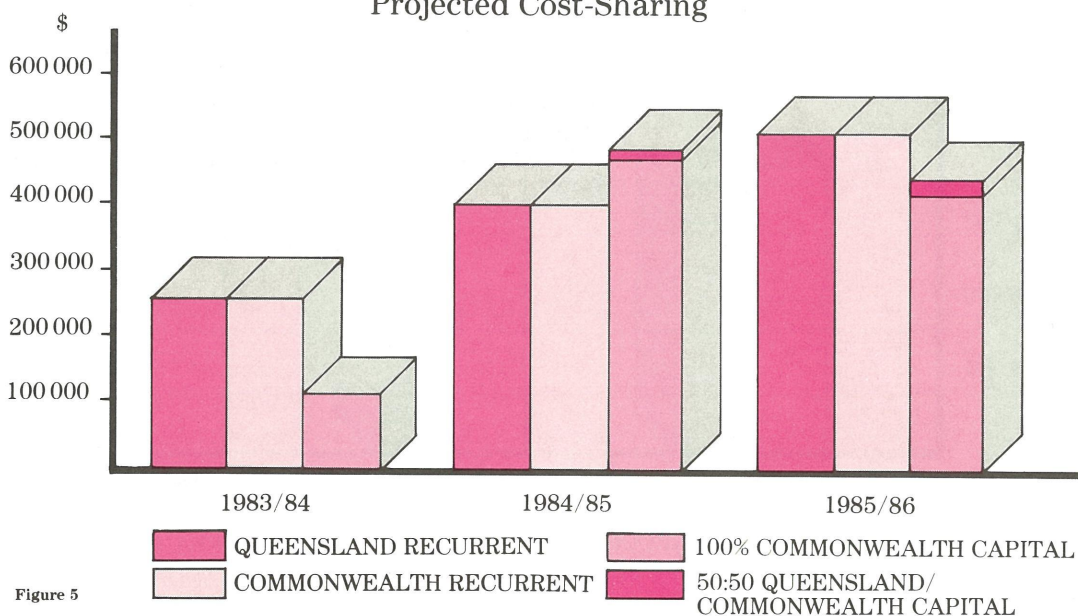


Figure 5

(The Three-year Rolling Program is subject to budget allocation decisions by the Commonwealth and Queensland Governments).

Roles and Responsibilities

Responsibility for management of the Marine Park is shared between the Authority and the Q.NPWS. Day-to-day management is undertaken by staff of the Q.NPWS, working within guidelines and in accordance with policies and programs set by the Authority in consultation with Queensland agencies.

The Authority's Role

The Park Management Section of the Authority plays a vital role in planning and overseeing management programs and in co-ordinating activities for the Marine Park. Its responsibilities include:

- implementing provisions in the Zoning Plan and regulations, in co-operation with Q.NPWS
- assisting in the development of agreements between Governments for day-to-day management
- developing guidelines, policies, and programs for park management in consultation with other Government agencies
- assisting in the preparation of management plans for particular areas of the Marine Park
- co-ordinating activities with other Authority staff and with staff of the Q.NPWS in Brisbane and Rockhampton
- overseeing the conduct of day-to-day management programs, including payment of funds
- providing secretariat services for the Great Barrier Reef Marine Park Management Co-ordinating Committee (Management Co-ordinating Committee)
- preparing reports and policy advice to the Authority on Marine Park management matters
- advising on future zoning and management of other sections of the Marine Park
- developing, operating and reviewing an integrated permit system for the Marine Park.

Role of Queensland National Parks and Wildlife Service

The Q.NPWS has the responsibility for establishing and implementing day-to-day management procedures for the Marine Park. Its responsibilities include:

- implementing approved programs within policies and guidelines approved by the Authority
- developing sub-programs and projects for interpretation, monitoring, aerial surveillance, and boat patrols
- assisting in the preparation of management plans and proposals for declaration of restricted access areas
- establishing personal contacts with Reef users
- developing operational procedures
- purchasing equipment, recruiting staff and establishing offices and field bases.

In addition, Q.NPWS staff are responsible for day-to-day management of Queensland island national parks; the Queensland marine parks at Heron Island and Green Island; and Masthead Island, under trusteeship from the Lands Administration Commission.

During the past year, the roles and responsibilities of the staff of the Authority and the Q.NPWS have been refined through the practical experience of establishing operations for the Capricornia Section.

Authority staff also undertake management tasks that relate to statutory functions of the Authority or that have a Region-wide or industry-wide significance; for example, Authority staff provide extension services to the fishing and tourist industries, and conduct and monitor use and impact studies that have Region-wide application. Q.NPWS staff are involved in these activities insofar as their day-to-day management responsibilities, resources and programs allow.

Although the Authority and the Q.NPWS have separate roles, in many instances a complementary or team approach has been found to be the most efficient and effective, with staff of both agencies sharing responsibilities within broad program areas to make the best use of available resources and expertise. For example, the education program of the Authority and the interpretive program of the Q.NPWS have been integrated. It is planned to integrate aerial surveillance and monitoring programs in the coming year.

To ensure that the policies incorporated in the Zoning Plan and regulations are understood and applied by day-to-day management staff, the Authority participates in the training of staff of the Q.NPWS.

Liaison and Co-ordination

Co-ordination with Queensland Government agencies on Marine Park management matters is arranged through the Management Co-ordinating Committee. Members are nominees of the Chairman of the Authority, the Co-ordinator-General of Queensland, and the heads of the following Queensland agencies:

- National Parks and Wildlife Service
- Department of Primary Industries
- Land Administration Commission
- Department of Harbours and Marine.

The Chairman of the Management Co-ordinating Committee is the Executive Officer of the Authority. Park Management staff of the Authority provide secretariat services for the Management Co-ordinating Committee, which normally meets at least twice a year.

Staff of the Authority and the Q.NPWS co-ordinate their activities through formal meetings from which quarterly and annual reports on day-to-day management are submitted to the Authority. (Informal contacts are maintained at the regional and head offices on a day-to-day basis.)

OPERATIONS — CAPRICORNIA SECTION

Complementary Management

At its fifth meeting on 14 May 1982, the Ministerial Council agreed to the desirability of adopting complementary management regimes for the Capricornia Section, and agreed that the matter should be reviewed further in the light of a pilot study in relation to Heron Island.

Complementary management has been defined as:

'an objective of co-operative planning and management by the Commonwealth and Queensland Governments and their agencies which requires an analysis of differences between regulations applying to a particular activity occurring in areas adjacent to each other so that required legislative and management changes are identified and achieved resulting in a situation whereby:

- activities permitted in areas adjacent to each other are compatible with agreed management objectives*
- management arrangements in areas adjacent to each other are simplified and co-ordinated and costs are minimised*
- public confusion is minimised.'*

Complementary management depends on a network of administrative agreements by which agencies responsible for the Marine Park and adjacent areas, or for resources common to both, act in ways that are complementary and in accordance with agreed aims and objectives for the area as a whole.

Management Plans

Specific management plans are urgently needed for Lady Elliott Island and Reef, Lady Musgrave Island and Reef and Heron Island and Reef because of increasing intensity of use at these sites. Within the framework of the Zoning Plan, these specific plans will provide a sound basis for decisions on the uses of these areas. Draft plans are being developed jointly by staff of the Authority and the Q.NPWS. The management plans for Lady Musgrave Island Reef and Heron Island Reef will complement plans being developed by Q.NPWS for those islands.

Permits

The permit system for the Marine Park is designed to monitor activities that could have a marked impact on the Reef's resources, and to provide data on their extent and location for use in management plans and in future revisions of zoning plans.

Most of the permits issued by Authority staff delegates for the Capricornia Section are for research and educational programs. Delegates in the Q.NPWS issue permits mainly for shell and aquarium fish collecting (recreational or commercial) and aircraft operations. Statistics on permits issued during 1982/83 for the Capricornia Section are presented in Figure 6.

Some activities, such as collecting in the Queensland Heron/Wistari Reefs Marine Park, require permits under State legislation, in addition to Great Barrier Reef Marine Park permits. In such cases, staff of the Authority and the Q.NPWS consult before permits are issued.

Action has been taken to develop a single permit that can be issued under the joint authority of Commonwealth and State legislation for activities common to both.

PERMITS ISSUED FOR THE CAPRICORNIA SECTION

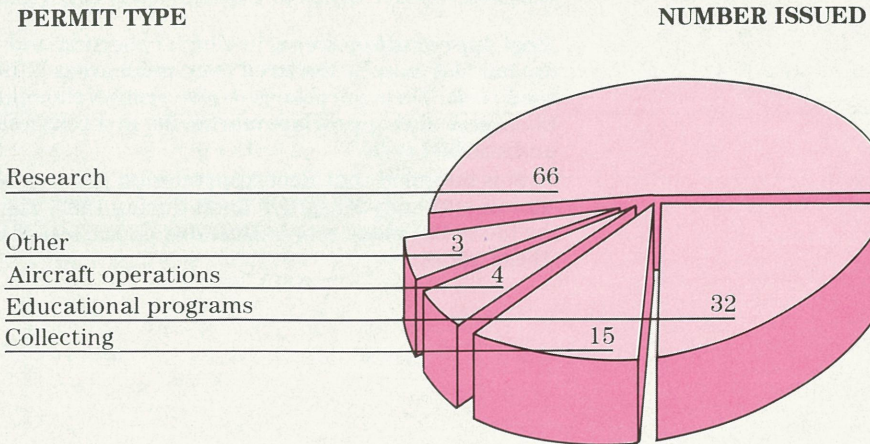


Figure 6

Surveillance

Aerial surveillance is an essential management tool for the Capricornia Section. The Authority receives Coastwatch reports from offshore flights covering most of the Region and from the littoral flights that fly daily from Cairns to Cape Grenville. The professionalism of the crews and their use of sophisticated technical equipment, such as 360° search radar and a global navigation system, ensure that the reports are accurate, comprehensive and not greatly affected by poor visibility. These reports are an important source of information on activities in the Marine Park and the Region as a whole. They can also be the basis for subsequent action, such as surface investigations, education and enforcement.

A recent development has been the use of a Coastwatch Nomad aircraft for night surveillance. The 360° search radar and global navigation system are essential for this purpose.

Areas of Periodic Restricted Use

The Zoning Plan for the Capricornia Section makes provision for the declaration of Seasonal Closure Areas, Replenishment Areas, and Reef Appreciation Areas.

Seasonal Closure Areas have been declared e.g. to protect important bird- and turtle-nesting sites on certain islands from human intrusion during the nesting season.

Fairfax Islands Reef was declared a Seasonal Closure Area from 1 October 1982 to 1 March 1983. Proposed Queensland national park legislation to seasonally restrict access to certain islands is expected to come into effect before the 1983/84 bird- and turtle-nesting seasons. Since Queensland legislation will then be able to protect the colonies of birds and turtles, no further declaration of Seasonal Closure Areas in Capricornia is expected.

Reef Appreciation Areas, in which collecting and fishing are banned, may be declared over small areas of heavily used reefs. Their purpose is to give visitors the opportunity to observe and appreciate marine life in a relatively undisturbed state.

It is intended that Reef Appreciation Areas be declared at Heron and Lady Musgrave Reefs during 1983. The public will be invited to make representations on the intent to declare these areas.

Replenishment Areas may be declared for specified periods (two to three years) in heavily used portions of the Section to allow depleted fish and other resource stocks to recover.

Replenishment Areas have been declared to take effect from 1 July 1983 at North Reef (for a period of three years) and at Boulton Reef (for a period of two years). These reefs were chosen because their closure will not unduly reduce availability of fishing areas in the Section, and their geographical position will make infringements relatively easy to detect. The proposed declarations will be essentially experimental, to test the effects of closures on depleted fish stocks.

Day-to-Day Management

The transfer last year of the Marine Parks Section from the Department of Primary Industries to the Q.NPWS somewhat delayed the recruitment of staff and establishment of facilities. As a result, the first eleven staff for the Capricornia Section were recruited simultaneously. Work is proceeding towards definition of the lines of responsibility and role of Marine Park management within the Q.NPWS. In consequence, management of the Capricornia Section should become more firmly established.

Capricornia Section day-to-day management operations for the year emphasised the appointment and training of staff to the Q.NPWS. Thirteen staff were appointed: six Marine Parks Officers, five Marine Parks Technicians, and two clerical support staff. The Q.NPWS has regional headquarters in Rockhampton, with a field base on Heron Island. Teams are rostered to maintain an almost full-time presence of staff in the Section. The Authority will review staffing at the end of 1983 to consider whether further appointments are warranted.

The Annual Program also provided for the conduct of training activities in co-operation with Authority staff and the initiation of monitoring, management, research and interpretive projects. Prior to the appointment of the Rockhampton-based staff, interim management operations were carried out by Q.NPWS Officers from Brisbane, who played a major role during the year in overall supervision of the new officers and their projects.

The first patrol craft, a twin-hulled, nine-metre Power Cat, *Protector II*, was delivered in September 1982, and began regular patrols of the Section later in the year. These patrols are carried out in conjunction with aerial surveillance by the Coastwatch Nomad aircraft and supplementary flights by Q.NPWS staff in chartered aircraft.

Marine Parks Officers and Technicians assisted visitors to the Capricornia Section, mainly on Heron Island and Reef, by giving slide presentations and leading reef, island and nesting-turtle walks, and snorkelling and discussion sessions.

OTHER ACTIVITIES

Concom Workshop

Simon Woodley, Senior Park Management Officer for the Authority, took part in a Council of Nature Conservation Ministers (CONCOM) Technical Workshop on Marine Reserve Management in Perth during October 1982. He presented a paper entitled 'Management of the Great Barrier Reef Marine Park', and with a senior officer of the Q.NPWS led a discussion session.

Minke Whale

A dwarf minke whale *Balenoptera acutorostrata* entered Hook Reef lagoon in late August 1982 and remained there for about three months. Staff from the Authority and James Cook University of North Queensland monitored the whale's condition and made several unsuccessful attempts to induce the whale to leave the lagoon.

The whale eventually left the lagoon of its own volition late in November 1982, but died nearby shortly afterwards. The whale had been joined by many large sharks in the week before its death. The day before its death, fifteen sharks in the lagoon had been killed by a professional shark catcher.

An autopsy of the whale showed no definite cause of death, although it was found to have been suffering from internal infection, a peptic ulcer and starvation.

The Authority's involvement in this incident highlights some of the issues in such conservation efforts. Human interference in natural events is not necessarily to the advantage of the wild animals involved. Neither can efforts to achieve the conservation of natural resources, including the fauna of the Great Barrier Reef, normally justify killing one species in order to save another. On the other hand, non-manipulative scientific monitoring may produce information useful for dealing with similar incidents in the future.

THE FUTURE

In the preparation of zoning plans for the Cairns and Cormorant Pass Sections, the Park Management Section contributed data drawn from its experience with the Capricornia Section. Such information is important if the Authority is to avoid creating potentially unmanageable zones or controls. Planning for the management of the Cairns and Cormorant Pass Sections is underway, beginning with the endorsement of a Three-Year Rolling Program 1983/84 to 1985/86. These Sections are expected to come into operation in the last half of 1983.

Although experience in managing the Capricornia Section has been valuable in planning the management of the Cairns and Cormorant Pass Sections the practical application of plans and regulations is by no means straightforward.

The Capricornia Section seems to be a relatively simple 'model' in contrast to expectations for management of the Cairns Section. The many physical differences between the two sections in size, distance from the coast, types and numbers of reefs and islands, as well as different patterns of use suggest that establishing management of the Cairns Section will be a major challenge.



The rewards of a day's fishing, Beaver Reef.

EDUCATION AND INFORMATION

Successful management of the Marine Park — already the world's largest marine park — depends to a large extent on users and visitors voluntarily adopting a code of behaviour that is compatible with the zoning and management plans and regulations for the Park. To attempt to enforce legislation without seeking and encouraging the willing co-operation of the community would require an almost impossibly high level of surveillance and enforcement. Such measures would not be cost-effective, nor would they produce a genuine desire within the community to care for this magnificent part of our natural heritage.

Over the past year, the Education/Information Section has been consolidating a program designed to encourage users themselves to be responsible for regulating their Reef-related activities. In addition, staff developed and implemented public participation programs and services required to assist the Planning Section undertake the processes of zoning the Cairns and Cormorant Pass Sections of the Marine Park.

Of particular interest has been the development of programs with various operators in the Reef-related tourist industry. The industry generally recognises the importance of 'educational tourism', and is turning to the Authority and the Q.NPWS for assistance in developing innovative and worthwhile educational activities. Naturally, such activities further the aims of the governmental management agencies, and co-operative arrangements are being developed between the commercial and government sectors that will ensure a high quality and increased output of educational materials and services related to the Marine Park and the Reef.

Currently, education/interpretation programs are being developed in conjunction with the staff of the Q.NPWS which has a major responsibility for undertaking educational activities related to the Capricornia Section.

FORMAL EDUCATION PROGRAM

Project Reef-Ed, which was described in detail in the 1981/82 annual report, continued to be a major project during the year. Originally it was intended to produce a teachers' handbook for fieldwork in the Capricornia Section of the Marine Park. However, after receiving widespread comment on the excellence of Stage 1 material produced by the Project Reef-Ed Team, it has been decided to broaden the project. The intention now is to produce a teachers' handbook for guiding student fieldwork anywhere in the Region. To complement the handbook, guides for specific reef destinations most suitable for student excursions and

fieldwork are being produced. Companion guides for Heron, Lady Musgrave, North West and Lady Elliott Islands and Reefs have been developed. Work is continuing on refining educational objectives, designing additional activities, and developing the format of the materials for publication.

Following review and comment by the Education Department of Queensland and nearly fifty classroom teachers, an earlier curriculum project, *Encounters with the Reef*, is now undergoing revision in preparation for publication in late 1983. *Encounters with the Reef*, which was produced for the Authority by staff of the then Townsville College of Advanced Education, is designed for classroom use with senior primary and junior secondary students.

A children's book on the Great Barrier Reef is to be published in late 1983. Intended for nine to twelve year olds, it will appear in the *Young Australian Readers' Series* published by Thomas Nelson Australia. It was prepared by staff of the Education/Information Section.

The ever-increasing interest shown by teachers and students in the Great Barrier Reef and the Marine Park encouraged the Section to publish a newsletter, two issues of which have now appeared. The title of the newsletter, *Ebb and Flow*, highlights the dynamic force of the marine environment and announces the desire for a two-way flow of information between the Authority and schools.

The Section continues to help the many teachers and students who request information and resource material on the Reef and Marine Park.

EXTENSION PROGRAM

Many groups in the community use the Reef in a variety of ways, whether as a source of their livelihood or as an integral part of their recreational experience. These groups, highly diverse in membership and interests, have equally diverse information needs. Importantly, they also have stores of experience and knowledge that are of great value to the Authority in developing the Marine Park and reviewing zoning plans and management provisions.

The reciprocal flow of information is co-ordinated through the Extension Program. An Education and Interpretation Working Group, set up jointly with the Q.NPWS, co-ordinates and guides activities that promote interaction with user groups. Staff regularly conduct fieldwork trips and meetings for residents of coastal centres adjacent to the Capricornia and Cairns Sections. Particular attention has been given to interaction with representatives of the tourism and fishing industries.

Extension activities enable staff to tailor the interpretation of the Marine Park concept and management provisions to the particular information and usage needs of the individual or group. Fieldwork in the Capricornia Section is co-ordinated with officers of the Q.NPWS based in Rockhampton, while officers of the Q.NPWS based in Cairns have been involved in extension work on Green Island.

A Reef Activities Workshop was conducted on Green Island in November 1982 in response to a proposal from the management of the Green Island Resort (Hayles Holdings Pty Ltd) and the Q.NPWS. The objective of the workshop was to design a set of activities that could be used by staff at a Great Barrier Reef resort to help their guests explore and enjoy the island and reef in an educational and non-destructive manner. These activities, together with logistical information and scientific data, are described in a manual that has subsequently been warmly welcomed by tourist operators in and adjacent to the Marine Park. The Reef Activities Workshop illustrates the value of tourism interests and Commonwealth and State agencies working together. It will be used as a model for future exercises of a similar nature.

Many tourism operators, including Reef cruise and charter boats, resorts, and fishing and diving associations, have requested assistance in developing educational materials to complement their reef activities. A special task force is developing guidelines for assisting these people to spread the message about the Marine Park and the Reef.

INFORMATION DISSEMINATION PROGRAM

Day-to-day management of the Capricornia Section is now fully operational and the zoning plans for the Cairns and Cormorant Pass Sections will probably be implemented in late 1983. Consequently, information materials are needed for specific user groups in addition to those already produced on the general Marine Park concept.

Information packages are currently being prepared for fishing, boating, diving and other user groups. As well as explaining zoning and usage provisions for activities within the Marine Park, the packages contain activity guides and explanations of the permit system. These materials are designed to assist users to understand the Marine Park concept and, through an increased appreciation of the Great Barrier Reef and its resources, to create an awareness and understanding of the need to accept and support the zoning and management provisions.

A heightened awareness of the development of the Marine Park has been promoted during the year through the mounting of eight regional information displays, and through wide circulation of *Reeflections*, the Authority's quarterly newsletter. Widespread distribution of existing information materials continues. The highly popular poster series has been reprinted. A new poster series is being

developed and will carry a stronger identification of the Marine Park concept.

Information on the development of the Marine Park, management policy and related matters is increasingly being disseminated through the media, specialist journals, and publications produced by Reef-related interest groups such as resort operators.

PUBLIC PARTICIPATION PROGRAM

Zoning the Reef, a public participation program, was conducted during the last four months of 1982. Its aim was to encourage public comment on the draft zoning plans for the Cairns and Cormorant Pass Sections. As with the earlier program that invited comment prior to the development of zoning plans for the Sections, *Zoning the Reef* reached communities from Townsville to Cooktown through information displays, explanatory brochures, maps, and extensive media coverage. Media advertising and brochure distribution also provided nationwide information on the draft zoning plans. Fifty-one public meetings in centres on the coast adjacent to the Cairns Section were addressed by Authority members and staff.

An innovative information display, located in Cairns, provided a cornerstone for the public participation program. Using a computer control unit and associated equipment generously provided by the Commonwealth Department of Transport, a question/answer, audio-visual program was developed with the valuable assistance of Film Australia. The display invited people to select any of thirty-eight commonly asked questions about the draft zoning plans; the response was a screened illustrated answer. A short audio-visual entitled *The Marine Park and You* was incorporated in the display unit.

This novel approach to meeting the information needs of people generated a high level of interest and proved to be a very effective focus for the public participation program.

GENERAL SERVICES PROGRAM

In order to improve access to current research being funded by the Authority a number of reports have been published. *Cook, Cays and Corals; a bibliography of publications about the Great Barrier Reef Marine Park Cairns Section*, was published in December 1982 and distributed to university libraries and interested persons throughout Australia. *Annotated Checklist of the Coral Reef Fishes in the Capricorn-Bunker Group Great Barrier Reef Australia*, a record of species found in the Capricornia Section of the Marine Park, documents 864 species, an increase of 282 species over earlier checklists for the Capricorn/Bunker group. The Great Barrier Reef Marine Park Authority *Research Report 1976/82* is a detailed summary of all research consultancies arranged by the Authority.

Statutory publications that have been produced during this period are the 1981/82 Annual Report and the draft and final zoning plans for the Cairns and Cormorant Pass Sections. The zoning plans for the Cairns and Cormorant Pass Sections required five detailed colour maps. These high quality maps are invaluable in interpreting the zoning plans and have proved to be most effective in developing community awareness and understanding. In order to assist groups who wish to duplicate these maps, black and white versions are being produced.

THE FUTURE

The accelerated declaration of the remaining sections of the Park will necessitate the rapid implementation of public participation programs. Concurrently, as zoning plans are implemented for the Cairns, Cormorant Pass and subsequent Sections, there will be increasing demand for more information materials to support the requirements of day-to-day management.

FREEDOM OF INFORMATION

The Commonwealth *Freedom of Information Act* 1982 (FOI) became effective as of 1 December 1982.

To date no FOI requests have been received. This may reflect the fact that information has always been readily available to the public from the offices of the Authority.

The processing of enquiries made under provisions of the FOI for access to documents of the Authority or of the Consultative Committee is the responsibility of officers of the Education/Information Section. Internal procedures to be followed by Authority staff are set out in an FOI procedures manual, adapted from guidelines issued by the Attorney-General's Department. Responsibility for granting or denying access to documents rests with the Executive Officer for requests made to the Authority, and with the Secretary for requests made to the Consultative Committee.

The Chairman and six senior officers of the Authority staff have attended training seminars conducted by the Attorney-General's Department. Internal briefing sessions have been conducted for all members of staff.

LIBRARY

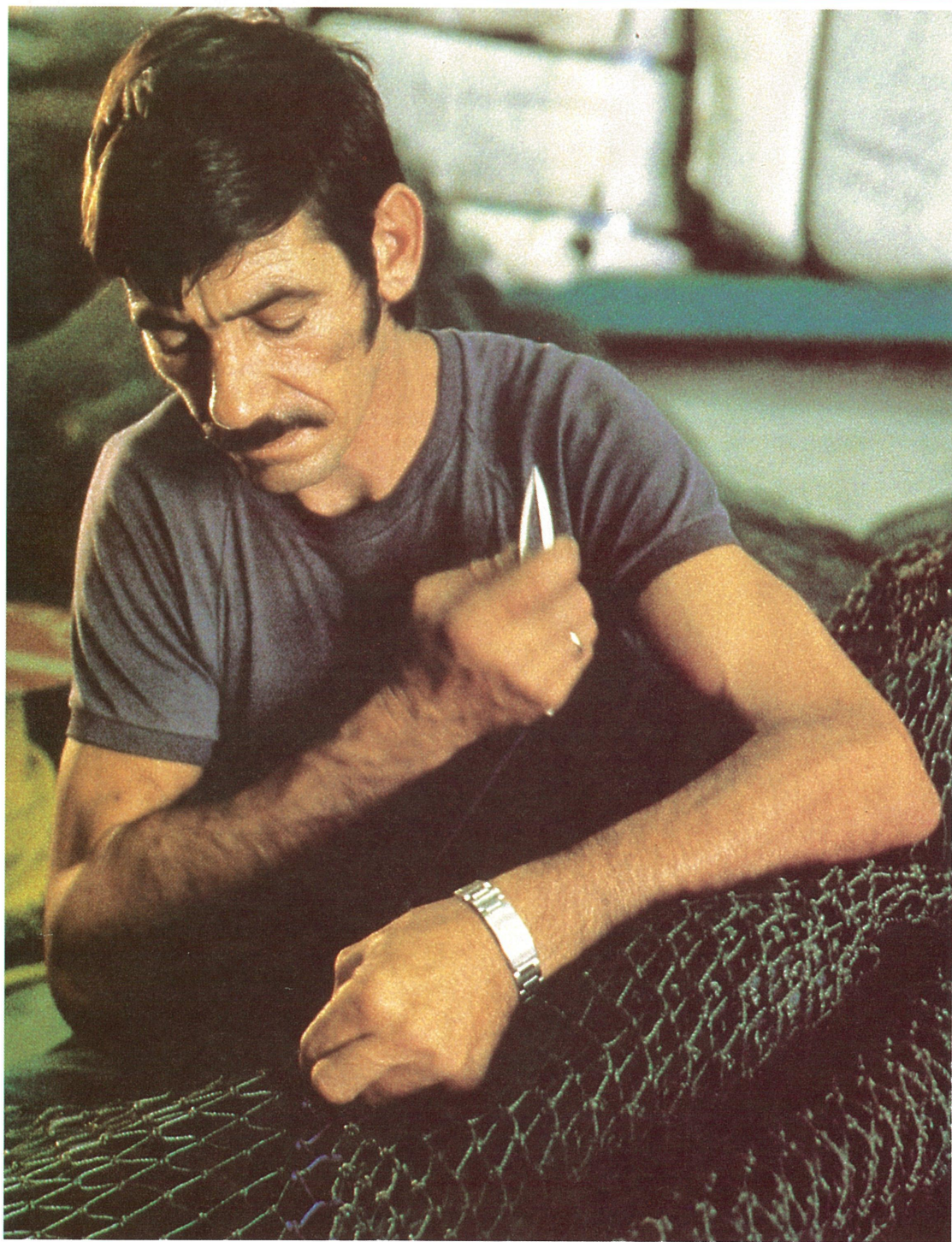
The aim of the library is to aid the Authority and staff in the pursuit of their duties by providing rapid and efficient access to information in published material in the library's own collection or those of other libraries. The Authority's library collection is also used by students, visiting researchers and members of the public, and some library service is provided to other institutions with which the Authority has geographic or operational ties.

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 special collections on tourism, environmental management, national parks and government administration.

The REEF bibliographic database is expanding rapidly. Material published since July 1982 has been indexed for inclusion in the database, and indexing of pre-1982 materials has begun. The first batch of this indexing was used for the production of *Cook, Cays and Corals; a bibliography of publications about the Great Barrier Reef Marine Park Cairns Section*. A monthly current awareness bulletin issued by the library is attracting interest among coral reef workers in Australia and overseas.

During the year under review, the library was moved to the Authority's new offices, and a complete revision of the photographic slide collection was implemented to improve access to the holdings. The Authority's serial holdings are now listed in the union catalogue operated by the James Cook University of North Queensland.

The demand for library services continues to grow, both from Authority staff and from outside the organisation. It has so far been possible to fulfil these demands without expanding the resources by making greater use of computerised services and streamlining internal library operations.



Repairing trawling nets, Townsville.

RESEARCH AND MONITORING

The principal functions of the Research and Monitoring Section are to implement the research policies and priorities of the Authority and to recommend research projects to the Authority which are consistent with these policies and priorities. As the Authority is not primarily a research organisation, it conducts only limited research itself; most of the research is conducted by outside bodies. The Authority encourages organisations to include topics of interest to the Authority in their own research programs, but where necessary the research can be supported, either in whole or in part, under an Authority contract or grant. During the year, universities, private consultants and other research institutions have received support from the Authority research budget of just over \$250 000.

The research requirements of the Authority relate to almost all aspects of the planning, development and management of the Marine Park. Thus a wide range of disciplines is encompassed in the research program. Over the period 1976 to 1982, research funding has been approximately evenly divided between the natural and physical sciences, and socio-economic research. Although emphasis is placed on research to aid the Marine Park planning process, this year several projects were instituted for management and monitoring programs. As new Sections are included in the Marine Park, projects with an emphasis on monitoring may be expected to increase.

Information on the fifty-six research projects in progress in 1982/83 is presented in Appendix C. Included in this number are thirteen Augmentative Research Grants awarded to students for the 1983 academic year. This grant scheme is designed to assist recent graduate or post-graduate students conducting studies relevant to the Marine Park.

In order to fulfil its responsibility to co-ordinate and report on research in the Great Barrier Reef Region, the Authority liaises with institutions and individuals conducting and/or supporting Reef-related research, including universities, the Australian Institute of Marine Science, the Commonwealth Scientific and Industrial Research Organisation, the Queen's Fellowships and Marine Research Allocations Advisory Committee, and State and Commonwealth Departments.

The staff of the Research and Monitoring Section has increased in 1982/83 to four persons. Staff experience and qualifications complement the range of disciplines covered in research on the Reef.

Highlights of some of the projects in progress in 1982/83 follow.

CAIRNS SECTION CORAL TROUT SURVEY

Coral trout populations on forty-four reefs in the Cairns Section of the Marine Park were extensively surveyed in early 1983 by biologist Dr Tony Ayling and three diver biologists. Coral trout serve as an indicator species for direct and indirect human impacts on the Reef. Five cross-shelf transects of reefs off Innisfail, Cairns, Port Douglas, Cooktown and in the Lizard Island area were selected to ensure a representative coverage. The length frequencies of coral trout populations were quantified, using a intensive SCUBA search technique developed by the Authority and a straight line search technique. Information on coral communities and crown of thorns starfish populations was also recorded for each reef. Coral trout were found to be relatively abundant on mid-shelf reefs but less so on inner- and outer-shelf reefs. Species composition also changed across the cross-shelf transects, from inner- to outer-shelf reefs. The data collected will serve as a reference for future monitoring of the effects of the zoning plans and management in the Cairns Section of the Marine Park.

CORAL REPRODUCTION STUDY

A group of researchers and post-graduate students at James Cook University of North Queensland studying reproduction in three species of hard corals at Magnetic Island has produced some interesting data on the timing and frequency of coral reproduction.

Two of the corals *Acropora* and *Goniastrea* spawned around four days after full moon in October and November; *Turbinaria*, contrary to expectations, had not spawned by May. The corals showed quite different reproductive patterns, and differences in the timing of the major spawning seasons were detected even between adjacent bays on the island. The study emphasised, however, the relatively short period of time during which a large proportion of corals on a reef will spawn, which means it may be possible to accurately forecast the annual dates of spawning. Such information will be useful in predicting periods during which disturbance would most seriously damage a reef.

The James Cook University group addressed the question of strategies for restocking damaged or denuded reefs. It was suggested that species might be managed according to their means of reproduction. For example, *Acropora formosa* has a comparatively low fecundity but grows relatively quickly from fragments. Therefore the best stocking strategy for this species may be depositing large numbers of fragments in denuded areas. For those species



Tourism and commercial fishing: the subjects of studies in the Authority's research program.

of coral that reproduce best from spawning, sexually mature colonies would have to be translocated. Information on the minimum size of these colonies for sexual reproduction and on whether they are hermaphroditic (both sexes occurring in the same colony) or dioecious (male and female polyps occurring in separate colonies) is essential for providing successful spawning stock. It is anticipated that further research on this topic will eventuate in a handbook of practical guidelines to recolonising denuded coral areas.

CIRCULATION AND SEDIMENT MOVEMENT AT BAYHEAD FRINGING REEFS

A three-year project to measure the circulation and sediment movement around bayhead fringing reefs began this year. Associate Professor David Hopley and Ph.D. student Kevin Parnell from the Geography Department of James Cook University aim to produce a model of bayhead dynamics to predict the effects of development on islands, e.g. resort development, in terms of effluent disposal and water quality.

Initial data collection and model development will be based on the characteristic bayhead fringing reef at Pioneer Bay, Orpheus Island, with subsequent calibration of the model at three or more resort beaches. Currents will be measured in order to determine circulation patterns. Water quality will be measured and sediment analysis undertaken to gauge the effect of inputs from development. Because the model will be applicable to both island and some mainland situations, the Queensland Water Quality Council is being consulted on this project. The results are expected to be useful in providing guidelines for the design of resort developments to minimize impacts on the Reef environment.

SURVEY OF SEABIRD COLONIES

A census is being taken of seabird colonies in the Capricornia Section of the Marine Park to provide baseline data for future monitoring. Dr Kees Hulsman of the School of Australian Environmental Studies at Griffith University is conducting a two-year study of populations during the annual breeding season to investigate the distribution and abundance of each species and reproductive success of breeding colonies. He is also banding seabirds to trace ranges of movement.

The first census, taken between December 1982 and January 1983, covered all the islands within the Capricornia Section of the Marine Park. Officers of the Marine Parks Section of the Q.NPWS assisted in part of the survey and familiarized themselves with seabird census techniques. A regular seabird monitoring program will probably develop from this project.

ECONOMIC IMPACT STUDIES

The Great Barrier Reef Region and adjacent mainland span four distinct economic regions. Analyses of the economic impact of Reef-related activities (commercial fishing, recreational fishing, island tourism, research, camping and charter boat operation) on these four economic regions were completed during the year. The Townsville and Rockhampton regions were studied in 1982/83; the Cairns and Whitsunday regions had been studied the previous year. Three of the regional studies were contracted to the Institute of Applied Social Research, Griffith University, with the fourth being completed under an Augmentative Research Grant by Griffith University honours student, Mr Peter McGinnity.

The term 'economic impact' refers to the effects in terms of employment and regional economic activity of expenditure on, or sales of, products of Reef-related activities. The technique of input-output analysis was applied to economic data collected to produce 'multipliers' that can be used to predict the impacts of any change in the level of economic activity. A brief summary volume of multipliers for the four regions has been produced and a volume covering all Reef-related activities in the four economic regions will be published during 1983/84.

AUSTRALIAN MARINE RESEARCH IN PROGRESS

In September 1982 the first edition of *Australian Marine Research in Progress* was published jointly by the Authority, the Victorian Institute of Marine Sciences and the Commonwealth Department of Science and Technology. This computerised summary of marine research projects in progress in the 1981/82 year will shortly be followed by the 1982/83 edition. It is planned to make the system interactive so that data on a range of topics relating to Australian marine research can be readily accessed.

THE FUTURE

Involvement in and evaluation of the planning and management of the increased number of sections of the Marine Park will require an expanded research effort, and further interaction with government agencies, research institutions and individuals.



Tourist cruise ship with escort of tugs, Cairns.

ADMINISTRATION

The Administration Section provides support to the Authority and staff of the Authority in the areas of finance, property, establishments, personnel and general services such as communications, travel, word-processing, typing and registry.

While basic services common to all government administration must be maintained, the nature and level of Authority administrative activities are for the most part determined by developments in relation to the Marine Park. Administrative programs in 1982/83 reflected the consolidation of developments relating to the Capricornia, Cairns and Cormorant Pass Sections and the expansion necessary to implement decisions to accelerate the declaration and zoning of future sections of the Marine Park.

In conjunction with these activities, the Administration Section is responsible for advising on relevant matters raised by the Public Service Board and the Departments of Home Affairs and Environment, Finance, and Administrative Services.

Early in 1981, in view of staff ceiling reductions and manpower deficiencies in Research and Monitoring, Planning, Park Management and Education/Information, the Authority decided that the most urgent priorities were in those Sections. Apart from the responsibility for establishing positions and recruiting and appointing staff, the expansion of those Sections and consequent developments in relation to the Marine Park have imposed significant additional demands on all administrative services. These were met as far as possible by augmenting permanent staff with temporary staff and trainees under various schemes and by working extensive overtime. In fact, the Administration Section incurred 58% of Authority expenditure on overtime in 1982/83.

In recognition of these factors and some functional changes, the Authority and the Public Service Board recently agreed to proposals that included measures to strengthen the Administration Section.

FINANCE

In the 1982/83 budget, Parliament appropriated \$3 253 800 for the Authority's activities. Further funds totalling \$222 361 carried forward from 1981/82 were also available. Under the cost sharing arrangements for day-to-day management of the Marine Park, receipts from the Queensland Government were \$191 387. Receipts from other sources, including the sale of information materials, amounted to \$11 624. Expenditure for the year was \$338 231. Full details are provided in Appendix D.

The application of funds by function is represented at Figure 7.

PROPERTY

In June 1982 the Authority moved to new premises at Melton Place, 67-71 Denham Street, Townsville. The three leased floors were fitted-out and furnished during the year, with special provisions for activities connected with audio-visual, design, drafting and computer services.

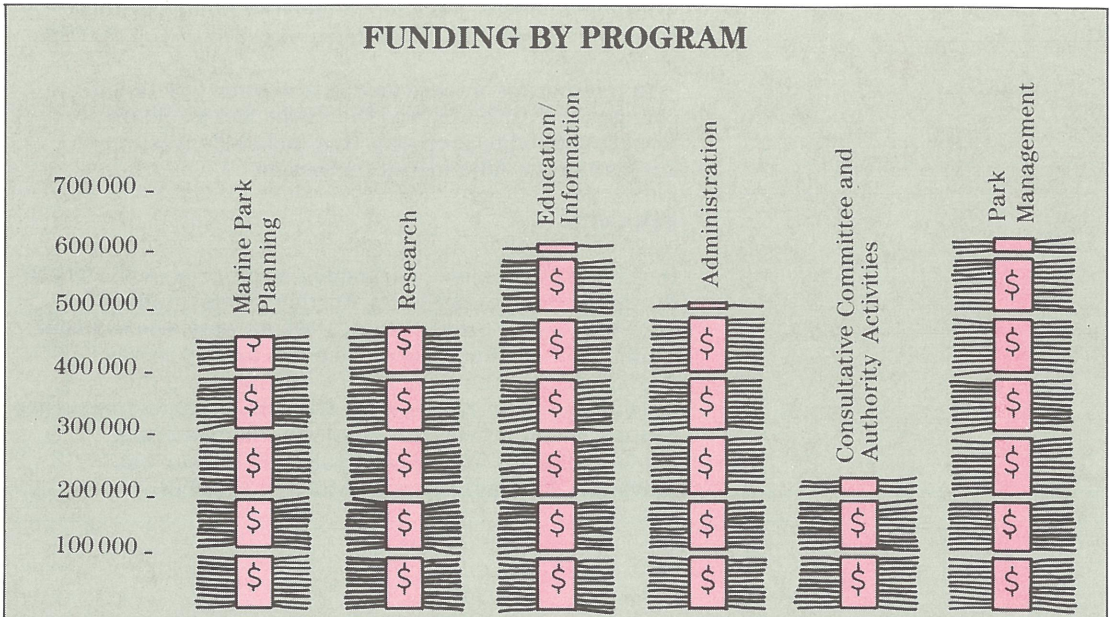
The ground floor shop-front reception foyer gives the Authority an identifiable and accessible public presence. Special displays and a reception/information counter are designed to attract and inform the public. The library, which the public can use for reference, is also on this floor.

ESTABLISHMENT

In November 1982, the Authority proposed a number of establishment variations to the Public Service Board. Essentially, it proposed formally dividing the Park Management and Information Section into separate Sections, and creating additional positions in Planning, Park Management, Education/Information and Administration.

The Board carried out a detailed inspection which resulted in general agreement to the proposal and certain other recommendations on the structure of the Administration and Secretariat Sections.

Figure 7



PERSONNEL

The Authority's ceiling for permanent full-time staff for 1982/83 was increased by five to thirty-nine. Following the decision to accelerate the program of declaration and zoning, the Public Service Board agreed to the Authority taking on five additional staff on two-year appointments. The Authority continued its participation in the Special Youth Employment Training Program, the National Employment Strategy for Aboriginals, the Britain/Australia Vocational Exchange Scheme and work assignments sought by education institutions.

With the work load associated with managing the Capricornia Section, establishing zoning plans for the Cairns and Cormorant Pass Sections, co-ordinating research in the Great Barrier Reef Region, investigating areas for future inclusion in the Marine Park, and increased administrative responsibilities, the case for a further ceiling increase was argued strongly.

Information on the distribution of staff as at 30 June 1983 is provided in Figure 8.

WORD-PROCESSING

The Authority acquired its first word-processing system in 1979 as the basis for document production. The stand-alone units became inadequate in terms of capacity and configuration, and late in the year the Authority acquired a distributed intelligence system to provide additional capacity and a decentralised service. One of the stand-alone units will be transferred to the Canberra Office and linked to Townsville. The system will also interface with the Authority's micro-computer to facilitate the transfer of data to declaration reports and other technical publications.

THE FUTURE

On 6 June 1983 the Authority was advised of its operative staffing level at 30 June 1983 to be used as a basis for revised staff estimates for 1983/84. The full-time level notified is fifty-four, an increase of ten over the level previously set.

The Administration Section is able to react immediately to this decision by implementing recruitment plans and by finalising additional accommodation and improved word-processing facilities. Appointment of additional administrative staff is also imminent.

These initiatives are aimed at the maintenance of efficient services necessary to support developments in relation to the Marine Park.

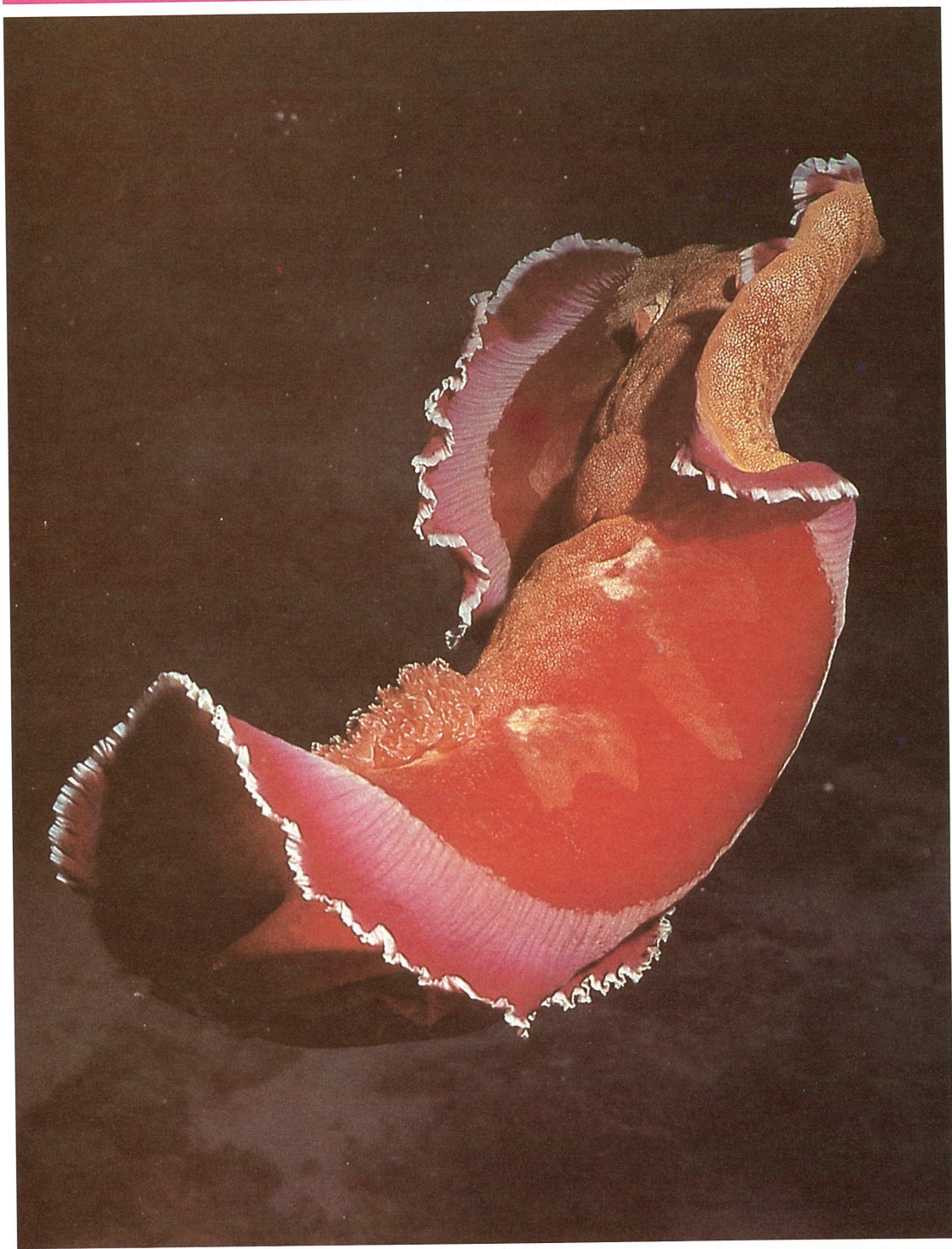
STAFF OF THE AUTHORITY AT 30 JUNE 1983

SECTION	PERMANENT	TEMPORARY Full-time	TEMPORARY Part-time	TOTAL
Executive	1	1		2
Research & Monitoring	3		1	4
Planning	6	3		9
Park Management	3	1		4
Education/ Information	4	5	2	11
Secretariat	1			1
Administration	10	2	2	14
Townsville	25	12	5	45
Canberra	3		1	4
TOTAL	31	12	6	49

Figure 8

LIST OF APPENDIXES

A. EXECUTIVE STAFF	57
B. PUBLICATIONS AVAILABLE	58
C. REPORTS ON RESEARCH FUNDED DURING 1982/83	61
D. FINANCIAL STATEMENTS	121
E. AUDITOR-GENERAL'S REPORT	126



Spanish dancer (*Hexabranhus imperialis*).

APPENDIX A

EXECUTIVE STAFF

Executive Officer Dr A.J. Gilmour

Planning Mr R.A. Kenchington

Research and Monitoring Dr J.L. Kermond

Park Management Mr S.J. Woodley

Education/Information Mr G.C. Morris

Administration Mr D.W. Chippendale

Canberra Office Mr B.T. Garton

ADDRESSES

Townsville Office
Melton Place, 67-71 Denham Street, Townsville, Qld 4810;
P.O. Box 1379, Townsville, Qld 4810
Tel: (077) 712191

Canberra Office
2nd Floor, Gas Industry House, Cnr Moore and Rudd
Streets, Canberra, A.C.T. 2601;
GPO Box 791, Canberra, A.C.T. 2601
Tel: (062) 470211

APPENDIX B

PUBLICATIONS AVAILABLE



BOOKS

Cook, Cays and Corals; a bibliography of publications about the Great Barrier Reef Marine Park Cairns Section Townsville, GBRMPA, 1982. ISBN 0-642-52297-9.

Frankel, Edgar. ***Bibliography of the Great Barrier Reef Province.*** Canberra, AGPS, 1978. 204 p. ISBN 0-642-03902-X (hardback) 0-642-03645-4 (paperback).

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.

TECHNICAL MEMORANDUM SERIES

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

Craik, Wendy. ***Fisheries Factors Affecting Marine Park Management.*** Townsville, GBRMPA, 1978. (Technical Memorandum GBRMPA-TM-2). 30 p.

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

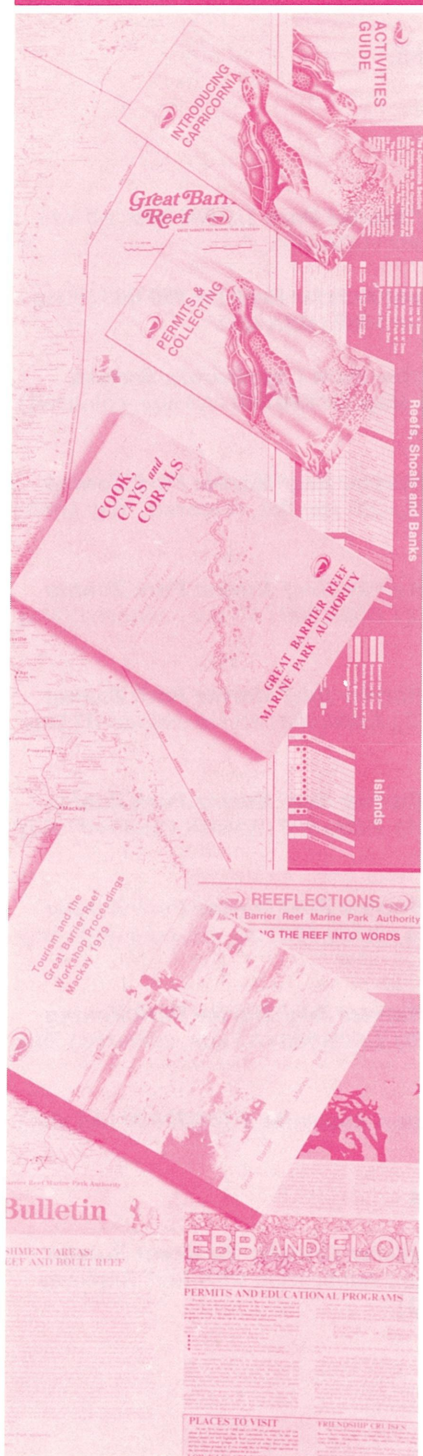
WORKSHOP SERIES (ISSN 0156-5842)

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), 462 p.

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

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

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) 182 p. ISBN 0-642-52273-1.



POSTERS

Fairfax Island and Reef, 1979.

Common Reef Hermit Crab, 1979.

Sea Slug on Turtle Grass, 1979.

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

ZONING PLAN PUBLICATIONS

Capricornia Section Zoning Plan [Townsville], GBRMPA, August 1980. 30 p. + separate map.

Cairns Section Zoning Plan and the Cormorant Pass Section Zoning Plan. Townsville, GBRMPA, May 1983. 36 p. + 5 separate maps.

BROCHURES

Capricornia Section Great Barrier Reef Marine Park [interpretive brochures. Three titles: *Introducing Capricornia*, *Activities Guide*, *Permits and Collecting*. [Townsville, GBRMPA, 1983].

The Coral Polyp; Architect of the Great Barrier Reef, [1980].

The Great Barrier Reef Marine Park Authority Annual Report 1981/82. Townsville, GBRMPA, October 1982.

An Introductory Guide to Life on the Great Barrier Reef. Waterproof and non-waterproof versions. Photography by Len Zell and Bill Wood, August, 1981 [i.e. 1982].

Great Barrier Reef; Cairns to Lizard Island [Townsville], GBRMPA, 1981.

Under Capricornia: A Guide to the Capricornia Section of the Great Barrier Reef Marine Park. Robert Ingpen. Ruskin Press, June 1983.

SERIAL PUBLICATIONS

Reeflections (ISSN 0314-6510)
Volume 1 Number 1, September 1977.
Number 11, April 1983.

Ebb and Flow — Educational Supplement
(ISSN 0729-0403)
Number 1, December 1982.
Number 2, June 1983.



Bulletin

Number 4, August 1982.

Number 5, May 1983.

Number 6, June 1983.

MAPS

The Great Barrier Reef Marine Park 1:5 000 000 (A3 size, coloured) September 1982 (BRA Q5).

Companion Map to Great Barrier Reef 1:2 200 000 (Strip map, coloured) November 1982 (BRA Q6).

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 (1) (B5 size flat, coloured) May 1983 (BRA Q50).

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).

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

Great Barrier Reef Region Australia 1:10 000 000 (A4 size) NMP79/093.

JOINT PUBLICATIONS

Australia with Reef Explorer Cruises; the Great Barrier Reef and Coral Sea [joint publication with Reef Explorer Cruises, Townsville, 1982].

APPENDIX C

REPORTS ON RESEARCH FUNDED DURING 1982/83

1 OCEANOGRAPHY

1 Sedimentation between the Herbert River Delta and Orpheus Island

PERIOD: Jan 1981 — Dec 1982

ORGANIZATIONS: James Cook University, Department of Geology
Australian Institute of Marine Science

PROJECT LEADERS: Dr D. Johnson
Dr M. Risk (formerly with the Australian Institute
of Marine Science)

CONSULTATION AND LIAISON: Dr C. Cuff, Geology, JCU
Mr N.C. Davidson, Honours Student, JCU

PROJECT OFFICER: Mr R. Kenchington

SUPERVISOR: Mr R. Kenchington

FINANCIAL SUPPORT: GBRMPA — \$5,150

OBJECTIVES

To detail the terrigenous-carbonate transition between the Herbert River Delta and fringing reefs at Orpheus Island. To quantify sediment inputs to the reef. To investigate the geochemical record in coral skeletons.

IMPLICATIONS/MANAGEMENT NEEDS

This study will indicate the extent of the effects of terrigenous impacts on the Great Barrier Reef lagoon and enable gradients of effects to be described. Such information is needed as background to monitoring activities and also to evaluate extreme inputs to the Great Barrier Reef lagoon from the land.

METHODOLOGY

Fringing reefs were investigated using a small boat to collect samples. Sediment traps were set on the reef. Bottom samples and push cores were taken between the delta and the reefs, and results integrated with earlier shallow seismic profiling studies.

STATUS

Field work has been completed. Awaiting final report.

LOCALITY: Herbert River Delta — Orpheus Island

Drift Card Study of Great Barrier Reef Surface Currents

PERIOD: Jan 1981 — July 1983

ORGANIZATION: James Cook University, Department of Marine Biology

PROJECT LEADER: Dr J.D. Collins

CONSULTATION AND LIAISON: Coastwatch
Mr T.A. Walker, Q.NPWS

PROJECT OFFICER: Mr R. Kenchington

SUPERVISOR: Dr J. Kermond

FINANCIAL SUPPORT: GBRMPA — \$70,040

OBJECTIVES

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

IMPLICATIONS/MANAGEMENT NEEDS

This project will provide data which is important to understanding surface water movements in the Great Barrier Reef. It will enable production of predictive models for oil slick dispersal and dispersal of larvae. It will also provide a set of data upon which to base hypotheses for more refined studies of water movement in the Great Barrier Reef Region.

METHODOLOGY

80,000 drift cards have been released regularly over an eighteen month period by Coastwatch aircraft at fourteen sites in the Great Barrier Reef Region. Computer analysis of data from returned drift cards will be undertaken and related to wind data throughout the Region.

STATUS

Final report submitted and being considered by GBRMPA.

A report on the pilot study drops has been prepared for GBRMPA:

Walker, T.A. and Collins, J.D. 1981. A drift card study in the central region of the Great Barrier Reef Lagoon.

A paper of relevance to the project was published earlier:

Walker, Terry and Collins, John. 1980. Surface currents of the central Great Barrier Reef studied. *Australian Fisheries* 39(12) 8-9.

Walker, T.A. and Collins, J.D. 1982. Great Barrier Reef Surface Drift Studied. *Australian Fisheries* 41(12)7-9.

Circulation and Sediment Movement on and around North Queensland Bayhead Fringing Reefs**PERIOD:** Jan 1983 — June 1985**ORGANIZATION:** James Cook University, Department of Geography**PROJECT LEADERS:** Assoc Prof D. Hopley
Mr K. Parnell**PROJECT OFFICER:** Dr W. Craik**SUPERVISOR:** Dr J. Kermond**FINANCIAL SUPPORT:** GBRMPA — \$10,452**OBJECTIVES**

Production of 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.

IMPLICATIONS/MANAGEMENT NEEDS

Further resort development in North Queensland is likely to take place in high island bayhead situations. Problems of effluent disposal will 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

Initial data collection and model development will be based on the characteristic bayhead fringing reef at Pioneer Bay, Orpheus Island, with subsequent calibration at three or four resort beaches. Direct measurement of current velocity and direction, combined with tracer data and salinity measurements will be used in model development.

Sediment analysis, using basic analysis techniques, as well as examination of input, will determine likely changes after catchment land use change, which may result in undesirable changes in the reef ecosystem. Water movement through the reef will be examined to determine the filtering effect. Tracers and current meters will be employed. Changes in water quality as a result of effluent discharge will be examined by direct simulation using tracers. The effect of construction activities on water and sediment movement will also be examined.

STATUS

Final report to GBRMPA due June 1985.

LOCALITY: Orpheus Island
3 or 4 other resort islands

2 MARINE GEOSCIENCES

9

Sea-water Interpretation from Modern and Holocene Corals of the Central Great Barrier Reef: a Spatial and Temporal Perspective

PERIOD: May 1982 — Aug 1983

ORGANIZATION: James Cook University, Geography Department

PROJECT LEADER: Mr F. Muir

PROJECT OFFICER: Dr W. Craik

SUPERVISOR: Assoc Prof D. Hopley; Dr J. Kermond

FINANCIAL SUPPORT: GBRMPA.— \$2,500;
Augmentative Research Grant: \$200

OBJECTIVES

To predict from present-day and Holocene corals the annual and seasonal ambient sea-water temperatures at the time of coral growth.

To provide a possible interpretation of Holocene sea-water temperatures as they relate to Holocene sea-level variations.

IMPLICATIONS/MANAGEMENT NEEDS

This study is designed to provide an indication of environmental factors influencing coral growth in the Holocene period. Temporal variations may be explained by changing climatic and oceanographic factors. Differences between nearshore fringing reef corals and offshore reef corals may be evident.

METHODOLOGY

Corals will be collected from present-day living reefs to establish modern thermometry standards against which the corals from submerged Holocene reefs can be compared.

Geochemical analysis and sclerochronology of the modern coral and fossil coral cores will be undertaken. Geochemical analysis will involve interpretation of Sr/Ca ratio levels. These ratios will be related to the sclerochronology density bands and C¹⁴ dates.

STATUS

Report to GBRMPA due August 1983. The project was extended to allow use of an electron probe in Melbourne.

Radiocarbon Dating of Fantome Island Fringing Reef Corals

PERIOD: May 1982 — Dec 1982

ORGANIZATIONS: James Cook University, Department of Geology
McMaster University, Ontario, Canada

PROJECT LEADERS: Dr D. Johnson
Dr M. Risk (formerly with Australian Institute of
Marine Science)

PROJECT OFFICER: Dr W. Craik

SUPERVISOR: Dr J. Kermond

FINANCIAL SUPPORT: GBRMPA — \$4,000

OBJECTIVES

To use radiocarbon dating of fringing reef corals to show the pattern of growth over last 5000 years.

IMPLICATIONS/MANAGEMENT NEEDS

This reef has been growing for the past 5000 years over a mud substrate. Growth and maintenance of a viable coral reef may be dependent on sustaining associated detrital deposits.

METHODOLOGY

Radiocarbon dating of three cores taken in May 1981 off the northern end of Fantome Reef (in a joint AIMS-Army project) is involved.

STATUS

Report submitted to GBRMPA January 1983. Report currently under revision by author.

LOCALITY: Fantome Island Reef

Geomorphological Information on the Continental Shelf Coral Reefs and Coastline from Fitzroy to Gould Island.

PERIOD: 1983

ORGANIZATION: James Cook University, Department of Geography.

PROJECT LEADER: Mr T. Graham

PROJECT OFFICER: Dr W. Craik

SUPERVISOR: Assoc Prof D. Hopley

FINANCIAL SUPPORT: GBRMPA Augmentative Research Grant — \$900.

OBJECTIVES

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

IMPLICATIONS/MANAGEMENT NEEDS

Information on the influence of European settlement on reef growth and bottom sedimentation will be gained.

METHODOLOGY

A combination of aerial photograph interpretation and ground survey will be used to study the geomorphology of the coastline. Reef structure will be investigated by a program of coring on fringing, mid-shelf and outer shelf reefs. Shelf bathymetry and pre-Holocene surface configuration will be studied from seismic reflection transects, in conjunction with the Bureau of Mineral Resources. A Ewing corer will be used to examine sediments in inter-reefal locations and on submerged outer reefs. The growth histories of corals and reefs will be investigated using X-radiographic techniques and C¹⁴ dating.

STATUS

Project underway.

LOCALITY: Cairns Section — Fitzroy Island, Gould Island.

4 BATHYMETRY AND SURVEY

17

Assessment of Aerial Photographs and LANDSAT Imagery for Coral Reef Data Collection

PERIOD: 1979 — Dec 1983

ORGANIZATION: James Cook University, Geography Department

PROJECT LEADER: Ms D. Kuchler

CONSULTATION AND LIAISON: Dr D. Jupp, CSIRO, Division of Land and Water Resources
Dr A. Hobbs, Jet Propulsion Lab, Pasadena, California
Dr R. Bina, Natural Resources Management Centre, Philippines

PROJECT OFFICER: Mr D. Claasen

SUPERVISORS: Assoc Prof D. Hopley, Dr D. Jupp, Dr J. Kermond

FINANCIAL SUPPORT: GBRMPA — \$23,449;
Augmentative Research Grants: \$1,184

OBJECTIVES

To test the accuracy of LANDSAT imagery and colour aerial photographs for recording inventory and monitoring data on coral reefs.

IMPLICATIONS/MANAGEMENT NEEDS

The Authority needs an efficient and economically viable means of acquiring up-to-date information on conditions of the Great Barrier Reef at any point in time. Collection of data by remote sensing on periodic overflights has been proposed as an alternative to ground data collection. This project is designed to provide basic facts about remotely sensed data (quality, quantity, cost) and to answer the following questions: What are the costs of using the competing data collection systems? Will all of GBRMPA's information needs be met by aerial photographs and LANDSAT imagery? If not, what part will be met and is it worth the effort?

METHODOLOGY

Use of the various inventory and resource-matrix analysis options in the Barrier Reef Image ANalysis Software Package (BRIAN) (see Project 18) resulted in a cross-tabulation relationship between interpreted aerial photographs and interpreted LANDSAT imagery and ground data.

Use of multiple acquisitions of LANDSAT imagery and aerial photographs together with the Layered or Multiple Image and Digital Change Detection (eg ratio and difference images) Techniques available in the BRIAN Package will result in an assessment of the capability of these remote sensing techniques for identifying and locating changes in the coral reef environment. A distinction will be made between the ability of LANDSAT and aerial photographs as monitoring techniques to realize that a change in the recorded data has taken place and the interpreter's ability to decide from the imagery what the change means in terms of reef cover.

STATUS

Final report to GBRMPA due December 1983.

Ground data collection from Green Island, Heron Island, Williamson and Ribbon No. 5 reefs has been completed. The accuracy of LANDSAT imagery and color aerial photographs for recording inventory data on coral reefs has been completed. A study testing the monitoring ability of these remote sensing techniques commenced in October 1982.

The following reports have been produced:

Kuchler, D.A. In press. Shoreline adjustments on Green Island Cay, Great Barrier Reef, Australia. *Australian Geographical Studies*.

Kuchler, D.A. 1982. Green Island Coral Cay, Great Barrier Reef, Australia: a collection of historical photographs 1925-1978. Presented to the Great Barrier Reef Marine Park Authority, Townsville, Australia.

Kuchler, D.A. 1982. Submission to GBRMPA regarding detailed information on usage and nature of reef areas in the Cairns and Cormorant Pass Sections of the GBR Region.

Kuchler, D.A. Submitted, Geomorphological nomenclature: Reef Cover and Zonation, GBR, Australia. Technical Report, GBRMPA, Townsville.

KUCHLER, D.A. Submitted, Classification System: Reef Cover and Zonation for use with Remotely Sensed Data, GBR Australia. Technical Report, GBRMPA, Townsville.

Jupp, D.L., Mayo, K.K., Kuchler, D., Heggen, S.J., and Kendall, S.W. Remote Sensing by Landsat as Support for Management of the Great Barrier Reef. LANDSAT 81. Proceedings of the Second Australasian Remote Sensing Conference, Canberra, September 1981.

Jupp, D.L., Mayo, K.K., Kuchler, D., Heggen, S.J., and Kendall, S.W. The BRIAN Method for Large Area Inventory and Monitoring. LANDSAT 81. Proceedings of the Second Australasian Remote Sensing Conference, Canberra, September 1981.

Jupp, D.L., Mayo, K.K., Kuchler, D.A., Heggen, S.J., and Kendall, S.W. In press. Landsat Based Multidate Information System for the Cairns Section of the Great Barrier Reef Marine Park. Report 1: Image Base and Index System, CSIRO, Technical Report, Canberra, Australia.

Jupp, D.L., Mayo, K.K., Kuchler, D.A., Heggen, S.J., and Kendall, S.W. In press. An Interpretation and Mapping of Landsat Satellite Data: Southern Part of the Cairns Section of the Great Barrier Reef Marine Park, Australia. CSIRO, Technical Report, Canberra, Australia.

Jupp, D.L., Mayo, K.K., Kuchler, D.A., Heggen, S.J., and Kendall, S.W. In press. An Interpretation and Mapping of Landsat Satellite Data: Central Part, Cairns Section, Great Barrier Reef Marine Park, Australia. CSIRO, Technical Report, Canberra, Australia.

LOCALITY: Capricornia Section — Heron Island;
Cairns Section — Green Island,
Williamson and Ribbon No. 5 reefs.

PERIOD: July 1981 — Oct 1982

ORGANIZATION: CSIRO, Division of Land Use Research

PROJECT LEADER: Dr D. Jupp

PROJECT OFFICER: Mr. D. Claasen

SUPERVISOR: Dr J. Kermond

FINANCIAL SUPPORT: GBRMPA — \$12,000

OBJECTIVES

To apply the BRIAN methodology to:

- (1) the northern reefs between Lizard Island and Cairns;
- (2) the Capricorn Bunker Group, to produce rectified colour products for both areas showing Landsat data and classes mapped over the raw data.

These images to include: raw data, reef cover maps developed from computer classification, depth of penetration images, exposure images and images of rectification error estimates.

IMPLICATIONS/MANAGEMENT NEEDS

This project will provide a map base and inventory of Landsat classes for the Cairns Section which may be used in the preparation of a zoning plan. It will also provide pre-survey stratification and design constraints for interpretive activities concerned with the Marine Park and aid the design of future field work to collect ground control data.

METHODOLOGY

The methods developed in a pilot BRIAN project (Research Project 18) will be applied to the reefs of the Cairns-Lizard Island area and the Capricornia Section. The knowledge of reef experts will be used to label the classification. Ground control data collected by the Australian Survey Office will be used to rectify the images.

STATUS

A report has been submitted and is being considered by GBRMPA.

Colour inkjet images for both areas have been produced at various scales. The technology has been transferred to the Australian Survey Office for routine production of these types of products.

LOCALITY: Cairns Section
Capricornia Section

PERIOD: Mar 1982 — Dec 1982

ORGANIZATION: James Cook University, Geography Department

PROJECT LEADERS: Mr. J. Oliver
Assoc Prof D. Hopley
Dr P.J. Isedale

PROJECT OFFICER: Dr J. Dunn

SUPERVISOR: Dr J. Kermond

FINANCIAL SUPPORT: GBRMPA — \$18,584

OBJECTIVES

To provide a series of maps at a uniform scale of 1:250,000 showing location, the shape and morphology and other specified characteristics of reefs and islands within the Great Barrier Reef Region, and a gazetteer of reefs. (Stage 1: 3 maps; Stage 2: 2 maps and gazetteer)

IMPLICATIONS/MANAGEMENT NEEDS

These maps would show greater resolution of reef shapes, location and orientation, and an up-to-date classification of reefs and islands that is not available on any existing series of maps or charts, and provide an aid for declaration, zoning, management, and education/information.

METHODOLOGY

Dyeline transparencies of reef and island classification maps will be prepared using as reference data the most recent rectified satellite imagery, photographs, Commonwealth reconnaissance maps, Queensland cadastral maps (for fringing reefs), photography by the Beach Protection Authority, charts and field data.

STATUS

The maps and gazetteer have been submitted to and are being considered by GBRMPA.

Five maps covering the entire Great Barrier Reef Region have been produced. The maps give a cartographic presentation of reefs showing morphological zones, islands, reef names etc. A gazetteer accompanies the maps and lists and classifies the reefs, and gives latitude, longitude, area, reef island type and presence of lights, beacons, resorts etc.

5 MARINE BIOLOGY

48

Coral Trout Monitoring at Escape Reef

PERIOD: Nov 1980 — Oct 1982

ORGANIZATION: Marine Research Foundation

PROJECT LEADER: Dr A. Ayling

PROJECT OFFICER: Dr W. Craik

SUPERVISOR: Dr J. Kermond

FINANCIAL SUPPORT: GBRMPA — \$1,800

OBJECTIVES

To determine the degree of natural variation in coral trout population size structures in different habitats over a year at one reef in the northern area of the Great Barrier Reef Region.

IMPLICATIONS/MANAGEMENT NEEDS

The project will give information relevant to the monitoring of coral trout on the following aspects:

- the natural variation of coral trout numbers
- the natural movement of coral trout.

METHODOLOGY

Monthly surveys of coral trout population size structures are undertaken in predetermined transects on the leeward and windward sides of Escape Reef.

The surveys involve use of the intensive search survey technique developed in the coral trout workshops.

STATUS

The project has been completed.

Monthly surveys beginning in November 1980 were interrupted and were resumed in October 1981 to run for a twelve-month period. Considerable variation between months is evident in surveys in the November to January period. Surveys have been completed and data given to GBRMPA for analysis.

LOCALITY: Cairns Section — Escape Reef

PERIOD: Jan 1981 — Dec 1982

ORGANIZATION: University of Queensland, Department of Botany

PROJECT LEADER: Dr A.B. Cribb

PROJECT OFFICER: Mr R. Kenchington

SUPERVISOR: Dr J. Kermond

FINANCIAL SUPPORT: GBRMPA — \$1,157

OBJECTIVES

To produce a handbook of the algal flora of Heron Island.

IMPLICATIONS/MANAGEMENT NEEDS

The handbook will provide a research and communication guide to the intertidal algae of Heron Island and adjacent reefs. Such information is required for (a) interpretive activities in the marine park and (b) as a precursor to the isolation of indicators of condition and impact.

METHODOLOGY

The field work involves collection of specimens and observations on variability.

STATUS

Specimens of over 200 species were collected. These included five species not previously collected from the area (one previously undescribed) and numerous specimens which furnished information on morphology or reproduction which had not previously been available.

Compared with the Heron Island Reef, that at Lady Elliott Island (examined only a fortnight later) supported only a depauperate algal vegetation. The bird population of Lady Elliott Island is also small compared with that of Heron Island. These differences between the two reefs support the suggestion made previously by Cribb that nutrients derived from birds on the cay may be one factor responsible for the relatively rich algal vegetation of the inner reef flat compared with the outer reef flat on reefs such as the Heron Island Reef.

Part I (Rhodophyta) of the handbook of the algae of the Capricornia Section has been completed and submitted for publication to the Great Barrier Reef Committee.

Awaiting final report on Part II.

LOCALITY: Capricornia Section — Heron Island Reef,
Lady Elliott Island Reef

PERIOD: Jan 1981 — Sept 1983

ORGANIZATION: Private Consultant

PROJECT LEADER: Dr P.G. Saenger

PROJECT OFFICER: Mr R. Kenchington

SUPERVISOR: Dr J. Kermond

FINANCIAL SUPPORT: GBRMPA — \$10,570

OBJECTIVES

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

IMPLICATIONS/MANAGEMENT NEEDS

Identification of algal components of reef systems is important for interpretation and extension activities in the marine park. An algal flora which contains species of importance as indicators of pollutants or of the well being of reefal systems may be identified.

METHODOLOGY

Systematic collection at various depths, habitats, etc. is being made to complete taxonomic studies already undertaken.

Quantitative studies on the phytobenthos are to be carried out by means of SCUBA diving techniques.

Marked study sites will be revisited at various intervals to determine seasonal and long term changes in species composition, standing crop, growth rates and reproductive development.

STATUS

Field work is still in progress (final field trip July 1983).

Awaiting final report.

LOCALITY: Swain Reefs

Checklist of Fishes in Capricornia Section**PERIOD:** July 1980 — Dec 1982**ORGANIZATION:** Australian Museum**PROJECT LEADER:** Dr B. Russell**PROJECT OFFICER:** Dr W. Craik**SUPERVISOR:** Dr J. Kermond**FINANCIAL SUPPORT:** GBRMPA — \$15,090**OBJECTIVES**

To compile and provide GBRMPA with existing information on the fishes of the Capricornia Section, in the form of an historical account of work done in the area, an annotated checklist of the fishes, a discussion of the ecological and zoogeographic relationships of the fishes, and a bibliography.

IMPLICATIONS/MANAGEMENT NEEDS

This information is not otherwise available, and will be extremely useful to workers and reef users, librarians etc.

METHODOLOGY

Examinations of fish specimens from the Capricornia Section of the Marine Park, and any other necessary specimens held in the Australian Museum or Queensland Museum, were made to provide information pertinent to the compilation of the checklist.

An historical account of biological investigatory work conducted in the Capricornia Section has been based on appropriate primary reference material. A complete bibliography of all this work as well as the references abbreviated in the checklist has been compiled.

STATUS

The checklist has been published.

LOCALITY: Capricornia Section

PERIOD: Sept 1981 — Sept 1982

ORGANIZATION: Private Consultants

PROJECT LEADERS: Mr H. Sweatman
Mr W. Gladstone

PROJECT OFFICER: Dr W. Craik

SUPERVISOR: Dr J. Kermond

FINANCIAL SUPPORT: GBRMPA — \$2,340

OBJECTIVES

To collect and provide data at monthly intervals on coral trout populations to provide a numerical indication of the natural variability in such populations on both the leeward and windward sides of Lizard Island Reef.

IMPLICATIONS/MANAGEMENT NEEDS

This project will provide information on natural monthly variation in coral trout numbers at Lizard Island Reef. It will be useful with respect to management programs introduced after declaration and zoning. It is important to know population parameters of coral trout (as an indicator of other large predatory fish) in the northern area.

METHODOLOGY

Surveys were made of coral trout using the intensive SCUBA search technique, developed by GBRMPA. Surveys were undertaken on leeward and windward sides of the Reef at monthly intervals for twelve months.

STATUS

The monthly surveys have been completed. They show considerable variation between months with the windward side generally having a higher population density of coral trout than the leeward side. The data have been provided to GBRMPA, no report was required.

LOCALITY: Cairns Section — Lizard Island Reef

Co-ordinated Study of Events surrounding Seasonal Synchronised Spawning in Three Species of Hard Corals**PERIOD:** Oct 1981 — Aug 1982**ORGANIZATION:** James Cook University, Department of Marine Biology**PROJECT LEADERS:** Mr J. Oliver
Ms B. Willis
Mr P. Harrison
Mr R. Babcock
Dr C. Wallace**CONSULTATION AND LIAISON:** Prof M. Pichon, Dr C. Alexander, Mr G. Bull
James Cook University**PROJECT OFFICER:** Dr W. Craik**SUPERVISOR:** Mr R. Kenchington**FINANCIAL SUPPORT:** GBRMPA — \$1,135**OBJECTIVES**

To determine 1981 spawning dates of the three species and relate to the 1980 spawning date and environmental parameters. To determine reproductive products of corals, means and patterns of dispersal, date of settlement, age of reproduction and relative fecundity of size classes.

IMPLICATIONS/MANAGEMENT NEEDS

This project follows on from the coral and fish monitoring workshop and the suggested use of coral reproductive information in monitoring reef health, by providing information on reproduction, dispersal and juvenile recruitment for three hard corals.

METHODOLOGY

Reproduction in selected species of three genera (*Acropora*, *Goniastrea* and *Turbinaria*) was studied at Nelly Bay, Magnetic Island during October and November, 1981.

The spawning behaviours of *A. formosa* (the study species), *A. valida*, *A. nasuta*, *A. hyacinthus*, *A. longicyathus* and *A. elseyi* were observed and documented. The spawning behaviour of *Goniastrea* was observed for the second successive year. Aspects of spawning in two other faviids, *Platygyra sinensis* and *Favia fava* were observed also. *Turbinaria* failed to spawn during the October-November study period. A more detailed study of this genus was subsequently undertaken.

Plankton hauls were made in the Nelly Bay area at regular intervals during the study month. Initially three hauls were made daily, later two and finally one.

To study recruitment patterns, settlement plates were set out at four sites at Nelly Bay over the five-week period in October-November, and the plates were picked up in February 1982.

STATUS

The project has been completed.

Some of the corals studied (e.g. *Acropora formosa*) reproduced during two periods, namely around four days after full moon in both October and November 1981. This was contrary to the expectation that a single breeding period would be seen. On the other hand, *Turbinaria mesenterina* and five other members of this genus had not spawned by May 1982 despite the presence of both eggs and sperm in October 1981.

Three different reproductive patterns were seen in the three main study genera namely:—
Acropora: simultaneous hermaphrodite, spawning egg/sperm masses, fertilization external.
Goniastrea: hermaphrodite, spawning gametes, fertilization external.
Turbinaria: dioecious, spawning products as yet undetected.

The plankton survey has yielded the first significant records of spawned coral products in surface or subsurface waters, and these should contribute to an understanding of the dispersal of coral offspring within and between reefs. Differences in the timing of the major spawning season were detected, between the study reef and the reef in the adjoining bay. This detail could also have important significance for management.

LOCALITY: Nelly Bay, Magnetic Island (off Townsville)

PERIOD: June 1981 — Sept 1984

ORGANIZATION: Queensland Department of Primary Industries
Fisheries Research Branch

PROJECT LEADERS: Mr R. Pearson
Mr W. Nash

PROJECT OFFICER: Dr W. Craik

SUPERVISOR: Dr J. Kermond

FINANCIAL SUPPORT: GBRMPA — \$38,151; QLD 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.

IMPLICATIONS/MANAGEMENT NEEDS

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. This study will enable guidelines to be drawn up for the management of a trochus fishery.

METHODOLOGY

A survey of the trochus resource in the Cairns and Mackay areas will be made to determine the distribution of trochus in relation to habitat, population densities, and size frequency distributions. Survey techniques involving SCUBA search along line transects (based on those used for other reef invertebrates) are being developed.

Basic biological studies will include growth rate (to be determined by size-frequency analysis and/or tagging), reproduction (breeding season, size/age at sexual maturity, fecundity), and movement (only in relation to recruitment into depleted areas).

The impact of a potential fishery on the Great Barrier Reef and on the trochus population will be investigated by (i) recording the impact of collection on other reef organisms including the effects of damage by divers; and (ii) resurveying areas at intervals after collection to record recovery of the trochus population.

STATUS

Delays were experienced in the commencement of this project. Work started in September 1982.

1. Significant differences in shell morphology exist between some populations. In general Mackay trochus do not grow as large as Cairns trochus. High density (i.e. commercially exploitable) populations tend to consist of small trochus with thick shells. Transplantation of stunted trochus to Cairns reefs has been initiated to see if this stunting is reversible. Caging experiments to test for different growth rates at different densities are also underway.
2. Cairns trochus spawn monthly, generally 2-3 days after the new moon. Spawning is initiated by males, and females follow with a brief spawning interval of 10-15 minutes. Trochus have been successfully reared past metamorphosis. Histological analysis of the gonads of Mackay populations suggests that spawning may occur less frequently there than on the Cairns reefs.
3. Growth rates are generally inversely related to shell size, although there is high variability within each size class.

Final report to GBRMPA due September 1984.

PERIOD: June 1982 — Apr 1984

ORGANIZATION: Heron Island Research Station

PROJECT LEADERS: Ms M. Preker

Dr I. Lawn

PROJECT OFFICER: Dr W. Craik

SUPERVISOR: Dr J. Kermond

FINANCIAL SUPPORT: GBRMPA — \$1,200

OBJECTIVES

To collect and provide data on coral trout populations on a monthly basis to provide a numerical indication of the natural variability in such populations.

IMPLICATIONS/MANAGEMENT NEEDS

This study is designed to provide information on natural monthly variation in coral trout numbers at Heron Island Reef. It will be useful with respect to management programs. It is important to know population parameters of coral trout (as an indicator of other large predatory fish) in the southern area of the Great Barrier Reef Region.

It will assist in interpretation of monitoring survey data.

METHODOLOGY

Twelve monthly surveys by intensive SCUBA search technique will be made over a 150 m transect at the unfished area of Heron Island Reef, previously surveyed in development of the technique.

STATUS

Surveys commenced April 1983.

LOCALITY: Capricornia Section — Heron Island Reef

**The Determinants of Coral Reef Community Structure: Dynamics of
Communities Dominated by the Genus *Acropora***

PERIOD: Dec 1981 — Dec 1982

ORGANIZATION: James Cook University, Department of Marine Biology

PROJECT LEADERS: Assoc Prof M. Pichon
Dr C. Wallace

CONSULTATION AND LIAISON: Dr T. Done, Mr W. Nash (genetic *Acanthaster
planci* studies)
Mr T. Walker (*Acanthaster* growth studies)

PROJECT OFFICER: Dr W. Craik

SUPERVISOR: Dr J. Kermond

FINANCIAL SUPPORT: GBRMPA — \$1,650; MSTGS — \$25,668

OBJECTIVES

To investigate the dynamics of coral reef communities dominated by various species of *Acropora* involving —

- a. successional changes in communities after a typical denudation
- b. changes in population structure of selected dominant species
- c. reproductive strategy of these dominant species
- d. patterns of juvenile recruitment.

IMPLICATIONS/MANAGEMENT NEEDS

This study is designed to examine the effects of disturbance, patterns of recolonisation, seasonality of reproduction and recruitment. The study site has been fully mapped using T. Done's stereophotography and this study will assist in the interpretation of larger-scale changes at the site. The area has been subject to *A. planci* increase and changes have been monitored.

METHODOLOGY

The project has three parts: a recolonization experiment, coral settlement studies, and population studies on selected *Acropora* species. They are being carried out on a suitable outer reef slope on Broadhurst Reef.

For the recolonization experiment portions of the reef were cleared of corals, then after an initial eleven month waiting period assessment of re-growth commenced. Settlement studies are being made by collecting data on recruitment to settlement plates which were set up in June 1981. For the population studies, large (25m²) quadrat plots are being studied for changes in tagged populations of several *Acropora* species. Reproduction in these tagged populations is also being followed.

STATUS

The project (mainly funded by MSTGS) began in May, 1980. The project for GBRMPA has been completed.

The major part of the research was a re-establishment survey at four sites. Recruitment to the four sites was variable. The recruits could be identified by genus after nineteen months and by species after twenty-seven months. Growth of the recruits was slower than expected from the literature. The settlement plate study established that there was a strong seasonal aspect to recruitment with the main recruiting season being from October to February. The number of recruits varied between the two years of observations. Juvenile corals preferred the bottoms of settlement plates in shallow sites and the tops of plates in deeper sites. The genus *Acropora* was studied. It was found that some species recruit mainly as adults, others only as juveniles and another species may rarely reach reproductive maturity.

There has been one publication from the project so far:

Wallace, C.C. and Bull, G.D. 1982. Patterns of juvenile coral recruitment on a reef front during a spring-summer spawning period. Proceedings of the 4th International Coral Reef Symposium, Manila, May 1981.

Further publications are being prepared in 1983.

LOCALITY: Big Broadhurst Reef (90 km east of Townsville)

**Distribution of Fish Larvae and Current Flow in the Vicinity of a Coral Reef,
Northern Great Barrier Reef**

PERIOD: Dec 1981 — Dec 1982

ORGANIZATION: Australian Museum

PROJECT LEADERS: Dr B. Goldman
Dr J. Leis

CONSULTATION & LIAISON: Dr J. Middleton (University of NSW)

PROJECT OFFICER: Dr W. Craik

SUPERVISOR: Dr J. Kermond

FINANCIAL SUPPORT: GBRMPA — \$2,400; MSTGS — \$25,950

OBJECTIVES

To determine fine scale distribution of fish larvae and current pattern in the vicinity of an outer ribbon reef and the Great Barrier Reef lagoon behind it.

IMPLICATIONS/MANAGEMENT NEEDS

This study will assist in understanding distributions of adult populations. It will determine species with 'local' populations (i.e. larvae remaining near their spawning sites) and species with 'widespread' populations (i.e. larvae which disperse from their spawning sites).

METHODOLOGY

Larval fish were sampled by plankton net, sorted under a dissection scope, and larvae were identified and quantified to values per m² or m³. Samples were taken along a multi-station transect near Lizard Island. Current meters were placed in the same area (mid-way in the water column). Replicate samples were taken and sampling was increased during the October-April spawning season.

Developmental staging of larvae will discriminate spawning or development sites.

STATUS

A report was prepared for and accepted by GBRMPA.

It was found that: (1) about 60% of reef fish larvae have random distributions (the authors predicted these taxa will have large population units); (2) about 40% of reef fish have non-random distributions and these should have restricted population units; and (3) most fish species of sport and commercial importance are in the first category.

Papers for publication are in preparation.

LOCALITY: Cairns Section — Ribbon Reefs, Lizard Island

PERIOD: Feb 1982 — Jan 1984

ORGANIZATION: Griffith University,
School of Australian Environmental Studies

PROJECT LEADERS: Dr M. Liddle
Dr A. Kay

PROJECT OFFICER: Mr R. Kenchington

SUPERVISOR: Dr J. Kermond

FINANCIAL SUPPORT: GBRMPA — \$59,849

OBJECTIVES

To determine the effects of human trampling on intertidal coral communities typically visited by reef walkers.

IMPLICATIONS/MANAGEMENT NEEDS

This study is designed to provide basic data for: (a) assessment of reef top impacts by officers of the marine park; (b) interpretive activities in the marine park.

METHODOLOGY

The amount of broken coral and the identity and abundance of sessile animal and plant species on untrampled pathways and pathways trampled to various degrees is being compared in a trampling experiment over a period of eighteen months.

Cordoned-off plots designed to keep people from walking on certain areas of coral are positioned in the region visited by the guided reef walks from the Heron Island resort. Comparison of the coral breakage and composition inside and outside of these plots will be made over a period of eighteen months to determine whether this area has been affected by the high numbers of people who visit it.

The ability of four common reef flat corals to survive and recover after human trampling will be assessed in a third series of experiments which will be designed to determine such things as the amount of force required to break the coral skeleton and the growth rate and survival rate of dislodged coral fragments and damaged colonies.

STATUS

The trampling experiment and the cordoned-off plots were set up in April and June 1982. Both experiments will terminate in November 1983.

An experiment to determine the survival and growth rate of variously sized and damaged fragments of three species of branching corals was set up in August and September 1982. Another experiment to record the growth rate of colony branches with and without their growing tips removed was set up in September 1982 for the same three species. These two experiments will terminate at latest in September 1983.

Final report to GBRMPA due January 1984.

LOCALITY: Capricornia Section — Heron Island

An Illustrated Key to the Parrot fishes (Family Scaridae) of the Great Barrier Reef**PERIOD:** July 1982 — Dec 1983**ORGANIZATION:** University of Auckland, New Zealand**PROJECT LEADER:** Dr H. Choat**CONSULTATION AND LIAISON:** Dr J.E. Randall, Bernie Bishop Museum;
Dr D. Williams, AIMS;
Dr B. Goldman, Australian Museum;
Dr J. Paxton, Australian Museum**PROJECT OFFICER:** Dr W. Craik**SUPERVISOR:** Dr J. Kermond**FINANCIAL SUPPORT:** GBRMPA — \$9,900; MSTGS — \$6,645**OBJECTIVES**

To produce an illustrated key to the parrot fishes of the Great Barrier Reef.

IMPLICATIONS/MANAGEMENT NEEDS

This project will provide assistance to scientists, reef users, educational programs etc. on identifying and separating what is probably the most difficult group of fishes to identify in the Great Barrier Reef.

METHODOLOGY

The key will contain the following information for each of approximately twenty-five species of parrotfish: classification of taxonomic status, meristic and structural data details of sequence of sexual and colour identities expected during life cycle with appropriate illustrations, local (within reef) distribution data, information on geographical distribution.

The key will be illustrated with photographs of parrot fishes at various life stages.

STATUS

Submission to Australian Museum Records is anticipated to occur in late 1983. Publication will follow editorial review.

PERIOD: Dec 1982

ORGANIZATION: Marine Research Foundation

PROJECT LEADER: Dr A. Ayling

PROJECT OFFICER: Dr W. Craik

SUPERVISOR: Dr J. Kermond

FINANCIAL SUPPORT: GBRMPA — \$620

OBJECTIVES

To find out if numbers of juvenile coral trout are underestimated in the standard hectare survey (using the intensive search technique) and to try alternative survey methods for small coral trout in particular. Particular attention is to be paid to methods that offer the possibility of testing statistically for differences between different areas or between a time series of counts.

IMPLICATIONS/MANAGEMENT NEEDS

This project will provide information for possible refinement of coral trout census technique. Coral trout censuses are used in monitoring reef fish status.

METHODOLOGY

Study sites on four reef zones at Lizard Island were surveyed using the standard one hectare count, 50 x 20 m counts, 50 x 10 m counts and 30 x 10 m counts. Information on length-frequency of coral trout was recorded, with attention to juvenile coral trout. Frequency of other piscivores was also recorded.

STATUS

A report was submitted and is being considered by GBRMPA.

It was found that four species of piscivores accounted for almost 80% of total serranid numbers. Coral trout were the second most abundant species in terms of numbers and most important by biomass.

A comparison of counts of coral trout in the different sized survey areas led to the conclusions that the 30 x 10 m sites were too small, the hectare counts probably underestimate numbers in some cases, and the 50 x 20 m counts are less likely to overestimate numbers than the 50 x 10 m counts. The consultant recommended 50 x 20 m surveys.

The number of juveniles observed depended mostly on reef zone and it was not possible to tell which transect size gave the most accurate estimate of juvenile numbers.

LOCALITY: Cairns Section — Lizard Island Reef.

Survey of seabird colonies of the Capricornia Section of the Great Barrier Reef Marine Park

PERIOD: Dec 1982 — July 1984

ORGANIZATION: Griffith University,
School of Australian Environmental Studies

PROJECT LEADER: Dr K. Hulsman

CONSULTATION & LIAISON: Dr J. Kikkawa, University of Queensland,
Queensland National Parks and Wildlife Service

PROJECT OFFICER: Ms S. Driml

SUPERVISOR: Dr J. Kermond

FINANCIAL SUPPORT: GBRMPA — \$10,411

OBJECTIVES

To census seabird colonies for distribution and abundance of each seabird species. To measure reproductive output of colonies, to continue banding program, to determine the reliability of aerial photographs to estimate population size, to measure forage distance.

IMPLICATIONS/MANAGEMENT NEEDS

By identifying sources and numbers of recruits, habitats available, status of colonies, etc., this study will assist decisions now for management and in the future for revision of the Zoning Plan.

METHODOLOGY

Visits to all islands are proposed over the breeding period 1982/83 and again in 1983/84 to census seabird colonies (relative numbers of noddies, shearwaters and bridled terns) and absolute numbers of other species.

The reproductive output of each species in each colony will be measured. Data will be collected on seabird movement from banding studies. Aerial photograph information (Hulsman 1981) will be related to actual densities and habitat, and forage distances of species will be calculated.

STATUS

The 1982/83 breeding season census has been completed, with all islands of the Capricornia Section being visited. The data gathered has been analysed by the consultant and an interim report submitted.

Final report to GBRMPA due July 1984.

LOCALITY: Capricornia Section

The effects of Fuel Oil, Oil Emulsifier, and Lowered Salinity upon the common Indo-Pacific reef coral *Acropora formosa*.

PERIOD: June 1983 — Mar 1984

ORGANIZATION: James Cook University,
Sir George Fisher Centre for Tropical Marine Studies

PROJECT LEADER: Mr P. Harrison

PROJECT OFFICER: Dr W. Craik

SUPERVISOR: Dr C.G. Alexander

Dr J.D. Collins

Dr J. Kermond

FINANCIAL SUPPORT: GBRMPA \$2,784

OBJECTIVES

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

IMPLICATIONS/MANAGEMENT NEEDS

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

The research will use coral *A. formosa* (widespread and well-studied), Bunker C fuel (widely used in Great Barrier Reef Region), emulsifier BPA-B (currently recommended by Department of Transport), lowered salinity (typical of increased urbanisation and industrialisation), in four treatments and control.

Healthy branches of *A. formosa* are collected from Geoffrey Bay and taken to the Australian Institute of Marine Science. Coral conditions are recorded by photography, and notes made on coral colouration extension, mucus and zooxanthellae extrusion. Tissue samples are collected for histology, single radial polyps are collected and fixed for ultrastructural study on transmission electron-microscope. Branch tips will be collected and examined by scanning electron-microscope study of skeletal growth form.

At each sampling, salinity, temperature and light will be recorded and a water sample extracted to determine oil and emulsifier concentrations. Branches will also be removed and put in fresh seawater to look at recovery.

STATUS

Final report to GBRMPA due March 1984.

PERIOD: Jan 1983 — Apr 1983

ORGANIZATION: Marine Research Foundation

PROJECT LEADER: Dr A. Ayling

PROJECT OFFICER: Dr W. Craik

SUPERVISOR: Dr J. Kermond

FINANCIAL SUPPORT: GBRMPA — \$43,750

OBJECTIVES

To evaluate the status of stocks of coral trout at selected reefs in the Cairns Section by collecting length-frequency data from visual surveys.

IMPLICATIONS/MANAGEMENT NEEDS

This study will assist revision of the draft zoning plan. The study will provide reference data for future monitoring of the effects of the zoning plan.

METHODOLOGY

Surveys will be conducted of forty-four reefs along transects off Innisfail, Cairns, Pt. Douglas, Cooktown and Lizard Island. At each reef 5 x 1 ha and 10 x 50 m transect counts of coral trout will be made using intensive SCUBA search techniques. Length-frequency data will be collected for each transect.

STATUS

Final report submitted to and being considered by GBRMPA.

Forty-four reefs were surveyed and on each reef the abundance of six species of coral trout recorded. Coral trout were relatively abundant on middle shelf reefs, being at the same relative abundance index as in the Capricornia Section. Fewer coral trout were found in the inner shelf area, with *P. maculatus* (bar-cheek coral trout) being the most abundant species. On the outer shelf reefs, again fewer coral trout were recorded with the blue-spot coral trout, *Plectropomus* sp. being most abundant.

LOCALITY: Cairns Section

PERIOD: Feb-Mar 1983

ORGANIZATION: Private Consultant

PROJECT LEADER: Mr L. Lafferty

CONSULTATION & LIAISON: Dr A. Ayling, Marine Research Foundation

PROJECT OFFICER: Dr W. Craik

SUPERVISOR: Dr J. Kermond

FINANCIAL SUPPORT: GBRMPA — \$500

OBJECTIVES

To collect fishing catch data to allow a comparison between fish catch and visual censusing by intensive SCUBA search technique as a means of determining coral trout population sizes.

IMPLICATIONS/MANAGEMENT NEEDS

The relationship between catch data and visual census data needs to be established, particularly as one type of data only is usually available (i.e. either catch or census data).

METHODOLOGY

Fishing for one hour periods for coral trout in areas including some in which 1 ha in which visual censusing of coral trout before and after the hour of fishing is undertaken. The areas covered mid-shelf and inshore reefs distributed between areas shown by visual census to have few trout and many trout.

STATUS

The consultant has provided catch data which will be analysed by GBRMPA. Preliminary analysis shows that few coral trout were caught relative to other fishes.

LOCALITY: Cairns Section

Presentation of Manta Tow Data**PERIOD:** Feb 1983 — Apr 1983**ORGANIZATION:** GBRMPA**PROJECT LEADER:** Mr L. Zell**PROJECT OFFICER:** Ms S. Driml**SUPERVISOR:** Dr J. Kermond**FINANCIAL SUPPORT:** GBRMPA — \$2,000**OBJECTIVES**

To prepare for publication attribute maps of the seventy reefs which have been surveyed by manta-tow to date.

IMPLICATIONS/MANAGEMENT NEEDS

The project will provide readily accessible physical information on seven attributes of each reef. This information has been used in planning and provides a baseline for management.

METHODOLOGY

Coral reef attributes were noted during the manta-tow surveys. Computer maps were produced of the attribute data. This project involves labelling the computer maps and photo-reducing the maps to a size suitable for easy reference and distribution.

STATUS

Photo-reduced maps have been produced.

LOCALITY: Cairns Section
Capricornia Section

PERIOD: Mar 1983 — Nov 1983

ORGANIZATION: James Cook University, Department of Zoology

PROJECT LEADERS: Mr G. Bull
Dr R. Jones

PROJECT OFFICER: Ms S. Driml

SUPERVISOR: Dr J. Kermond

FINANCIAL SUPPORT: GBRMPA — \$13,200

OBJECTIVES

To analyse data on visually dominant organisms collected in coral surveys.

IMPLICATIONS/MANAGEMENT NEEDS

The project will provide reference data on major coral communities for later comparison of information on communities within and between reefs.

METHODOLOGY

The consultant will undertake initial data analysis including basic descriptive statistics and preliminary cluster analysis. The results will then be discussed in a workshop of local coral specialists. It is intended that the workshop will recommend an approach for further analysis of the data. The consultant will then carry out full analysis using the recommended method.

STATUS

Final report to GBRMPA due November 1983.

LOCALITY: Capricornia Section
Cairns Section

Coral and Fish Survey, including Training**PERIOD:** Apr 1983 — May 1983**ORGANIZATION:** Great Barrier Reef Marine Park Authority**PROJECT LEADER:** Ms S. Driml**PROJECT OFFICER:** Ms S. Driml**SUPERVISOR:** Dr J. Kermond**FINANCIAL SUPPORT:** GBRMPA — \$1,500**OBJECTIVES**

To train GBRMPA staff in coral and fish survey techniques, and gather data in the process.

IMPLICATIONS/MANAGEMENT NEEDS

Trained staff will be able to participate in this and future surveys and develop an appreciation of reef assessment techniques. This will be of use in research and monitoring programs.

METHODOLOGY

Coral survey by the standard manta-tow technique and coral trout censusing by intensive SCUBA search technique will be taught by experienced GBRMPA staff members. Data on coral and coral trout will then be gathered on reefs off the Whitsunday coast.

STATUS

A limited training programme was completed. The 1982/83 program was shortened due to bad weather.

LOCALITY: Reefs off Whitsunday coast

Coral Trout Survey Whitsunday and Townsville Areas**PERIOD:** Apr 1983 — May 1983**ORGANIZATION:** Marine Research Foundation**PROJECT LEADER:** Dr A. Ayling**PROJECT OFFICER:** Ms S. Driml**SUPERVISOR:** Dr J. Kermond**FINANCIAL SUPPORT:** GBRMPA — \$12,000**OBJECTIVES**

To evaluate the status of stocks of coral trout at selected reefs in the Whitsunday and Townsville areas by visual survey.

IMPLICATIONS/MANAGEMENT NEEDS

To provide baseline data for Marine Park planning and subsequent management.

METHODOLOGY

Selected reefs in the Townsville and Whitsunday areas to be surveyed. Up to 5 x 1 ha and 10 x 50 m transect counts of coral trout surveys to be undertaken per reef. Intensive SCUBA search techniques used to gather coral trout length and frequency data which will then be averaged for each reef.

STATUS

Report submitted to and being considered by GBRMPA.

LOCALITY: Reefs off Townsville and the Whitsunday area

PERIOD: May 1983

ORGANIZATION: Great Barrier Reef Marine Park Authority,
Queensland National Parks and Wildlife Service

PROJECT LEADERS: Dr W. Craik
Mr G. Mercer

CONSULTATION & LIAISON: Local deep sea fishing clubs

PROJECT OFFICER: Dr W. Craik

SUPERVISOR: Dr J. Kermond

FINANCIAL SUPPORT: GBRMPA — \$10,000

OBJECTIVES

To determine the extent of reef fish movements around a reef and between reefs. To obtain length-frequency data on reef fishes.

IMPLICATIONS/MANAGEMENT NEEDS

Interpretation of replenishment area results. Information on reef fish movements.

METHODOLOGY

To tag reef fishes using lock-on spaghetti tags, dart and harpoon tags at Capricornia Reefs, especially Heron, Wistari, Masthead, Northwest, Boulton and North Reefs. Each fish caught is measured and identified by species, and such variables as time out of water, number of lines in water, time of tagging and bait used are recorded. Fish are returned to the water at the place of capture and this is recorded to the nearest km.

Teams will work off a charter boat and a small boat. Anglers will be sought from recreational fishing clubs adjacent to the Section.

The data are being continuously compiled for

- analysis on tag returns (currently approx. 2%)
- analysis of length-frequency data.

STATUS

By May 1983 over 5000 fishes of a variety of species had been tagged over a number of trips. The fishes were tagged using mainly lock-on spaghetti tags.

About 100 fishes have been recaptured, the majority in the vicinity of the tagging sites. Further trips are proposed to investigate different tags, double tagging, catch rates, bait, etc.

LOCALITY: Capricornia Section

Annual Survey of Recruitment of Selected Reef Species in selected Habitats on Capricornia Reefs.**PERIOD:** Apr — July 1983**ORGANIZATION:** Sydney University, Griffith University**PROJECT LEADER:** Dr P. Sale
Dr P. Doherty**CONSULTATION AND LIAISON:** GBRMPA**PROJECT OFFICER:** Dr W. Craik**SUPERVISOR:** Dr J. Kermond**FINANCIAL SUPPORT:** GBRMPA — \$10,000**OBJECTIVES**

To continue and expand a program monitoring recruitment of selected reef species in specified habitats on seven Capricornia Reefs.

IMPLICATIONS/MANAGEMENT NEEDS

This study will indicate the degree of variability in recruitment within and between reefs. It may assist in predicting adult population, distribution and abundance, and may have relevance to management and replenishment areas.

METHODOLOGY

Visual surveys will be conducted of seven Capricornia Section reefs namely; Wistari, Heron, Llewellyn, Fairfax, Lady Musgrave, One Tree, and Fitzroy Reefs.

Replicate sites in two habitats at each reef (lagoonal patch reefs and leeward reef slopes) will be surveyed to 20-25'. Results will be calculated to give densities per 100 m² for young (of year) of selected species seen. Four divers will survey seven reefs in ten days.

The following analyses will be undertaken:

- density differences between reefs of different species
- density differences between years of different species
- density differences between years of different reefs.

STATUS

The survey has been undertaken.

Final report to GBRMPA due December 1983.

LOCALITY: Capricornia Section

Monitoring Replenishment Areas: Coral Trout Survey Technique.

PERIOD: Apr — Aug 1983

ORGANIZATION: Great Barrier Reef Marine Park Authority
Queensland National Parks and Wildlife Service

PROJECT LEADER: Dr W. Craik

CONSULTATION AND LIAISON: Q.NPWS

PROJECT OFFICER: Dr W. Craik

SUPERVISOR: Dr J. Kermond

FINANCIAL SUPPORT: GBRMPA — \$10,000
Q.NPWS

OBJECTIVES

To monitor coral trout communities in replenishment areas, Heron, Wreck and Llewellyn (restricted activities) and North West reefs, Capricornia Section.

IMPLICATIONS/MANAGEMENT NEEDS

This project assessed the effectiveness of permanently closed, partially restricted and restricted reefs as replenishment areas.

METHODOLOGY

Surveys were made of eight reefs (thirty-one transects) before closure and at six monthly intervals thereafter, using intensive scuba search technique of surveying coral trout.

Results were assessed at the end of each survey and written up on a comparative basis.

Reefs surveyed were Boulton, North, Wreck, Llewellyn, North West, Heron, Fitzroy, Lady Musgrave.

STATUS

Survey took place in June 1983, just prior to closure of replenishment areas.

LOCALITY: Capricornia Section

Year to Year Variation in Recruitment of Juvenile Hard Corals on a Reef Front.**PERIOD:** Apr — Dec 1983**ORGANIZATION:** James Cook University, Department of Marine Biology.**PROJECT LEADER:** Dr C. Wallace**PROJECT OFFICER:** Dr W. Craik**SUPERVISOR:** Dr J. Kermond**FINANCIAL SUPPORT:** GBRMPA — \$1,876**OBJECTIVES**

To understand within and between year recruitment of corals to a reef. To test a simple method for monitoring coral recruitment on a continuing basis.

IMPLICATIONS/MANAGEMENT NEEDS

This study will provide information on natural variation in coral recruitment to enable assessment of human impact. It may provide a useful continuing method of measuring coral recruitment.

METHODOLOGY

In 1980-82, as part of a study of some dynamic aspects of a reef front coral community, a study was made of the recruitment of juvenile hard corals onto several parts of a reef front (see Research Project 66). The most significant recruitment was seen to occur during the summer months, but the summer of 1980-81 was apparently more "successful" for recruitment when compared with the summer of 1981-82, in which only approximately one-third of the 1980-81 numbers of recruits were obtained.

Since the research site was visited for other research during the following summer period, 1982-83, another set of recruitment plates has been set down, so that the previous findings can be compared with those of a third year. The plates will be processed and examined and compared with the previous two sets of summer plates.

STATUS

Final report to GBRMPA due December 1983.

LOCALITY: Big Broadhurst Reef (east of Townsville)

An Investigation into the Biology of Parrot Fish (Scaridae) With Particular Reference to Factors Influencing Their Distribution.

PERIOD: 1983

ORGANIZATION: James Cook University of North Queensland,
Department of Zoology

PROJECT LEADER: Mr D. Bellwood

PROJECT OFFICER: Dr W. Craik

SUPERVISOR: Dr N. Milward

FINANCIAL SUPPORT: GBRMPA Augmentative Research Grant — \$559

OBJECTIVES

To study the post settlement development of juvenile scarids.

To examine the biology of adult scarids, particularly their feeding biology.

IMPLICATIONS/MANAGEMENT NEEDS

Parrot fishes are one of the most important families of reef fish numerically and in biomass.

Knowledge of their biology is useful for management.

METHODOLOGY

The study of the post settlement development of juvenile scarids will be continued. The investigation of the spatial and temporal variation in juvenile scarid recruitment and the investigation of the biology of adult scarids will also be continued (see Research Project 72).

STATUS

Project underway.

LOCALITY: Cairns Section — Lizard Island Reef

Aspects of Community Dynamics and Biology of Scleractinian Corals on the Heron Reef Crest.

PERIOD: 1983

ORGANIZATION: University of Queensland, Department of Zoology.

PROJECT LEADER: Ms A. Bothwell

PROJECT OFFICER: Dr W. Craik

SUPERVISOR: Dr R. Endean, Dr J. Kikkawa

FINANCIAL SUPPORT: GBRMPA Augmentative Research Grant — \$900

OBJECTIVES

To monitor and catalogue parts of a coral community in a long-term study to provide information on temporal changes in recruitment, frequency and abundance of species etc.

IMPLICATIONS/MANAGEMENT NEEDS

This study is one of the few long-term studies on coral reef community organisation on back reef and reef crest areas.

METHODOLOGY

Over 40 x 1 m² quadrats have been established on the Heron Reef crest. The quadrats are in three groups, two in back reef locations and one to windward. A basic census is taken around August each year and involves making photographic records, additional higher resolution maps and observations of interactions. The records are made at the level of species and individual colonies in order to characterise the demography of the community generally as well as of species populations.

STATUS

Project underway.

LOCALITY: Capricornia Section — Heron Island Reef

PERIOD: 1983

ORGANIZATION: La Trobe University, Department of Microbiology.

PROJECT LEADER: Ms A. Duncan

CONSULTATION AND LIAISON: Dr C. Wilkinson, AIMS

PROJECT OFFICER: Dr W. Craik

SUPERVISOR: Prof J. Waid

FINANCIAL SUPPORT: GBRMPA Augmentative Research Grant — \$740

OBJECTIVES

To identify and characterise activities of microorganisms associated with coral. To evaluate the effect of perturbation on microorganisms e.g. nutrients, pollutants.

IMPLICATIONS/MANAGEMENT NEEDS

This study is designed to provide a greater understanding of the possible effects of pollution (oil, pesticides etc.) and eutrophication from both catastrophic events and low level inputs.

METHODOLOGY

Acropora will be collected from Magnetic Island. Bacteria, fungi, and protozoa will be isolated, enumerated and purified. Dead corals will be compared to determine if microorganisms cause or are the result of death. Subsequently in vitro perturbations will be examined.

STATUS

Project underway.

LOCALITY: Magnetic Island (off Townsville)

Abundance, Schooling Behaviour, and Population Dynamics of Silversides (Atherinidae) and Sprats (Dussumieriidae)

PERIOD: 1983

ORGANIZATION: University of Queensland, Department of Zoology.

PROJECT LEADER: Ms P. Dupee

PROJECT OFFICER: Dr W. Craik

SUPERVISOR: Dr K. Warburton

FINANCIAL SUPPORT: GBRMPA Augmentative Research Grant — \$760
Postgraduate Fulbright Award

OBJECTIVES

To quantify abundance and biomass of atherinids and dussumieriids. To evaluate the importance of atherinids and dussumieriids in the diet of predators and to calculate predation mortality. To assess the population dynamics of atherinids and dussumieriids.

IMPLICATIONS/MANAGEMENT NEEDS

Silversides and sprats are primary prey species for many predatory species of fish and seabirds. Understanding of this role in greater detail is relevant to management.

METHODOLOGY

Silversides and sprats will be collected and data analysed. Photographic and visual observations of these species will be undertaken.

STATUS

Project underway.

LOCALITY: Capricornia Section — One Tree Island Lagoon

PERIOD: 1983

ORGANIZATION: University of Sydney,
School of Biological Sciences

PROJECT LEADER: Ms G. Eckert

PROJECT OFFICER: Dr W. Craik

SUPERVISOR: Dr P. Sale

FINANCIAL SUPPORT: GBRMPA Augmentative Research Grant — \$900

OBJECTIVES

To investigate the ecology and life history of three species of labrids at One Tree Island Reef.

IMPLICATIONS/MANAGEMENT NEEDS

Labrids are sex-reversing fishes about which little is known. Some are vulnerable to fishing. Life histories in different habitats are important for management.

METHODOLOGY

The monitoring of settlement in different habitats, through observation and experiment will be continued. Juvenile mortality, adult populations, and social structure will be monitored. The sex of juveniles will be determined by experiment.

STATUS

Project underway.

LOCALITY: Capricornia Section — One Tree Island Reef

**Genetic Variability among Geographically Isolated Nesting Populations of
Caretta caretta.**

PERIOD: 1983

ORGANIZATION: Monash University,
Department of Zoology

PROJECT LEADER: Ms E. Gyuris

PROJECT OFFICER: Dr W. Craik

SUPERVISOR: Dr J. Baldwin
Mr C. Limpus, QNPWS

FINANCIAL SUPPORT: GBRMPA Augmentative Research Grant — \$593

OBJECTIVES

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

IMPLICATIONS/MANAGEMENT NEEDS

Management strategies may differ if there is only one population rather than two separate populations.

METHODOLOGY

Polymorphic proteins will be examined electrophoretically.

STATUS

Project underway.

LOCALITY: Capricornia Section;
Mon Repos, Bundaberg

The Productivity and Bioaccumulation of Trace Elements by Blue-green Algae of the Great Barrier Reef.

PERIOD: 1983

ORGANIZATION: University of Melbourne, Department of Chemistry

PROJECT LEADER: Mr G. Jones

PROJECT OFFICER: Dr W. Craik

SUPERVISOR: Dr J.D. Smith

FINANCIAL SUPPORT: GBRMPA Augmentative Research Grant — \$900

OBJECTIVES

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

IMPLICATIONS/MANAGEMENT NEEDS

Blue-green algae may accumulate trace elements and are grazed by *Holothuria atra*. The project will give base line analysis of algal productivity and trace element accumulation in the food chain.

METHODOLOGY

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

STATUS

Project underway.

LOCALITY: Cairns Section — Lizard Island Reef.

The Algal Bearing Ascidians of the Great Barrier Reef.**PERIOD:** 1983**ORGANIZATION:** University of Queensland, Department of Chemistry**PROJECT LEADER:** Mr D. Parry**PROJECT OFFICER:** Dr W. Craik**SUPERVISOR:** Prof C. Hawkins

Dr P. Mather

FINANCIAL SUPPORT: GBRMPA Augmentative Research Grant — \$890**OBJECTIVES**

To investigate the symbiotic relationship between algal cells and ascidian host. To establish a catalogue of algal bearing ascidians at Heron Island Reef. To provide a chemotaxonomic method to assist identification. To investigate the ability of ascidians to concentrate heavy metals and thereby act as indicators of pollution.

IMPLICATIONS/MANAGEMENT NEEDS

This project will provide information on oxygen levels on reef flats and on the ability of ascidians to concentrate heavy metals and therefore act as indicators of pollution.

METHODOLOGY

The objectives of the project will be pursued by:

- (1) Observation.
- (2) Isolation and identification of pigments from algae, together with the isolation and identification of compounds from the ascidian host. This may ultimately provide a chemotaxonomic method for the identification of species within this group which are otherwise extremely difficult to identify.
- (3) A study of metabolic pathways of the algal cells and the ascidian and, more important, a study of photosynthesis and respiration of these animals in the field.
- (4) Determination of the concentration of trace and heavy metals in these ascidians.

STATUS

Project underway.

LOCALITY: Capricornia Section — Heron Island Reef

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

PERIOD: 1983

ORGANIZATION: Griffith University,
School of Australian Environmental Studies.

PROJECT LEADER: Mr G.C. Smith

PROJECT OFFICER: Dr W. Craik

SUPERVISOR: Dr C. Catterall

Dr K. Hulsman

FINANCIAL SUPPORT: GBRMPA Augmentative Research Grant — \$900

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.

IMPLICATIONS/MANAGEMENT NEEDS

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

METHODOLOGY

It is planned to examine four species (bridled tern, lesser crested tern, crested tern, brown booby) in the Lizard Island area and Raine Island and to compare the findings with data from Capricornia.

Field work will involve locating breeding pairs, mapping of nest distributions in colonies, collection of data for calculating breeding parameters, banding young, monitoring growth rates of chicks, monitoring feeding behaviour, establishing weather recording equipment. Experiments to investigate supplementary feeding and nestling number manipulation may be undertaken.

STATUS

Project underway.

LOCALITY: Cairns Section.

Analysis of Density and Distribution of Breeding Populations of Wedge-tailed Shearwaters within the Capricorn Group.

PERIOD: 1983

ORGANIZATION: University of Queensland, Department of Geography.

PROJECT LEADER: Mr M. Vanek

PROJECT OFFICER: Dr W. Craik

SUPERVISOR: Mr G. Hill

FINANCIAL SUPPORT: GBRMPA Augmentative Research Grant — \$835

OBJECTIVES

To determine the existence of and relationship between density distribution patterns of breeding populations of *Puffinus pacificus* (wedge-tailed shearwaters) and their habitat in the Capricorn Group.

IMPLICATIONS/MANAGEMENT NEEDS

Shearwaters are part of the nutrient cycle transfer. They also contribute to colonisation, development, and maintenance of cays.

METHODOLOGY

Restricted random sampling along transect lines is being used to determine population density and habitat variables on islands of the Capricornia Section over several years.

STATUS

Project underway.

LOCALITY: Capricornia Section

Investigation of Environmental and Biological Factors causing Morphological Variation in Reef Corals, *Pavona cactus* and *Turbinaria mesenterina*.

PERIOD: 1983

ORGANIZATION: James Cook University of North Queensland,
Department of Marine Biology

PROJECT LEADER: Ms B. Willis

PROJECT OFFICER: Dr W. Craik

SUPERVISOR: Assoc Prof M. Pichon

FINANCIAL SUPPORT: GBRMPA Augmentative Research Grant — \$353

OBJECTIVES

To elucidate growth and reproductive strategies of *Pavona cactus* and *Turbinaria mesenterina*.

IMPLICATIONS/MANAGEMENT NEEDS

Information on spawning periods and growth requirements will enable the prediction of periods of vulnerability for these two coral species. Both are inshore reef species which may occur near tourist or heavily populated areas. The project is of relevance to recolonization of dead reefs.

METHODOLOGY

Growth and reproductive data for *T. mesenterina* will be collected to complete a two-year study of two growth forms of this species in Nelly Bay, Magnetic Island.

The growth over the past two years of two forms of *P. cactus* at Lizard Island Reef will be compared to test the hypothesis that fish grazing pressure is the selective agent responsible for the maintenance of polymorphism in this species.

Short-term experiments where branches of the protective corals are removed to expose the tips and bases of the convoluted form of *P. cactus* will also be initiated.

STATUS

Project underway

LOCALITY: Magnetic Island Reef (off Townsville)
Cairns Section — Lizard Island Reef.

Evaluation of Biological and Economic aspects of Coral Collecting in the Great Barrier Reef Region.

PERIOD: June 1983 — June 1985

ORGANIZATION: James Cook University, Sir George Fisher Centre for Tropical Marine Studies, Department of Marine Biology.

PROJECT LEADERS: Dr J.T. Baker, O.B.E.
Assoc Prof M. Pichon
Mr J. Oliver

CONSULTATION AND LIAISON: Mr R. Garrett DPI, Dr T. Done, Dr P. Sammarco AIMS,
Dr C. Wallace JCU,
GBRMPA.

PROJECT OFFICER: Dr W. Craik

SUPERVISOR: Dr J. Kermond

FINANCIAL SUPPORT: GBRMPA—\$82,230

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 in the Great Barrier Reef Marine Park.

IMPLICATIONS/MANAGEMENT NEEDS

Enforcement of the ban on Philippine exports is creating 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

The project has two aspects to be undertaken over a two-year period as shown below. Biological research on production —

- distribution and abundance using survey methods including those of Done and Dinesen and discussions with reef scientists
- size frequency surveys at several sites
- growth studies using photogrammetry, data collected by lessees.
- reproductive strategies and recruitment information to be sought from relevant researchers.
- asexual reproduction looking at 'reseeding' experimentally
- damage and mortality investigated by regrowth of 'pruned' colonies vs regrowth of colonies damaged by natural events

This study will be complemented by a proposed GBRMPA study on the economics of coral, shell, and aquarium fish collecting.

Management guidelines will be drawn up in association with GBRMPA staff.

STATUS

Final report to GBRMPA due April 1985.

6 ANALYSIS OF USE

95

Man-made Noise in the Ocean

PERIOD: Jan 1981 — Dec 1982

ORGANIZATION: James Cook University,
Department of Electrical and Electronic Engineering

PROJECT LEADER: Dr G.H. Allen

CONSULTATION AND LIAISON: GBRMPA — provision of some boat time in
conjunction with park management cruises.

PROJECT OFFICER: Mr R. Kenchington

SUPERVISOR: Dr J. Kermond

FINANCIAL SUPPORT: GBRMPA — \$3,000

OBJECTIVES

To measure the noise spectra of vessels and relate ship noise to ambient levels in the sea at various frequencies. This is a pilot project.

IMPLICATIONS/MANAGEMENT NEEDS

This study may enable the specification of a passive surveillance network to: (a) record use of areas of the marine park; (b) test the effectiveness of zoning plans; and (c) direct officers of management agencies to areas of high level use.

METHODOLOGY

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

STATUS

Awaiting final report.

**Socio-Economic Research Program for the Great Barrier Reef Marine Park
Authority**

PERIOD: Mar 1981 — June 1982

ORGANIZATION: Unisearch Ltd.
University of New South Wales

PROJECT LEADER: Dr G. McColl

PROJECT OFFICER: Dr J. Dunn

SUPERVISOR: Dr A. Gilmour

FINANCIAL SUPPORT: GBRMPA — \$31,000

OBJECTIVES

To review and assess in the light of recent socio-economic research and the Authority's objectives, the future socio-economic research program needs of GBRMPA.

IMPLICATIONS/MANAGEMENT NEEDS

This project will ensure that the Authority has up-to-date advice and an appreciation of priorities in developing its socio-economic program.

METHODOLOGY

A draft report was prepared covering fisheries, tourism/recreation and other matters. The draft was discussed at a two-day workshop in Brisbane in November 1981 attended by academics, State and Federal Government Departmental officers, individuals from private enterprise, the consultants and GBRMPA staff. As a result of these discussions a final report has been prepared.

STATUS

A draft report has been submitted to GBRMPA. Awaiting final report. The draft report contains identification of information gaps and a suggested research program which can be used as a basis for socio-economic research by GBRMPA.

PERIOD: June 1982 — Sept 1983

ORGANIZATION: James Cook University, History Department

PROJECT LEADERS: Prof B. Dalton
Mr H. Reynolds

PROJECT OFFICER: Dr W. Craik

SUPERVISOR: Dr J. Kermond

FINANCIAL SUPPORT: GBRMPA — \$26,200

OBJECTIVES

To collect material related to historical use and frequency of events in the Great Barrier Reef Region, with particular reference to the incidence of crown of thorns starfish.

IMPLICATIONS/MANAGEMENT NEEDS

This study has relevance to recent outbreaks of crown of thorns and the frequency and extent thereof. It will also meet an overdue need to collect and collate historical information (often unwritten) on the Great Barrier Reef.

METHODOLOGY

Information will be collected by: (i) conducting interviews using a standard format with long-time residents of areas adjacent to the Great Barrier Reef Region; (ii) a literature search to extend contacts and collect written information; and (iii) cross checking oral information on events with timing of other events and the written record.

STATUS

A report on Phase I of this study was submitted to GBRMPA in January 1983. Based on this report, it was decided to extend the research into a second phase. Phase II involves further field work and writing of a final report covering both phases. The final report is due September 1983.

PERIOD: Apr 1982 — Dec 1982

ORGANIZATIONS: Institute of Applied Social Research,
Griffith University

PROJECT LEADERS: Ms S. Driml
Mr T. Hundloe

CONSULTATION AND LIAISON: Dr R. Jensen, Mr G. West,
University of Queensland

PROJECT OFFICER: Dr W. Craik

SUPERVISOR: Dr J. Kermond

FINANCIAL SUPPORT: GBRMPA — \$9,930

OBJECTIVES

To calculate input-output tables for selected major activities in the Great Barrier Reef Region (fishing, tourism, research, recreation) for local and State economic regions. This will lead to assessment for Marine Park Sections and the entire Great Barrier Reef Region of beneficiaries of each dollar spent on the activities and hence the extent and locations of income and employment arising from current usage of the Great Barrier Reef Region.

IMPLICATIONS/MANAGEMENT NEEDS

This study will assist the evaluation of the potential impact of management measures (made for sections of the Marine Park and for the entire Reef Region) on the local economy, the State economy, and on local and state employment.

METHODOLOGY

Existing reef-oriented uses will be categorised into groups of activities (having similar expenditure patterns) for areas of the Great Barrier Reef Region (excluding the Cairns, Capricornia and Whitsunday areas already investigated). These activities will be inserted into input-output tables, multipliers calculated, and projections made of output, income and employment for relevant areas. Multipliers for Capricornia will be updated to the same base year to make projections for the entire Region. The location of money expenditure associated with the Great Barrier Reef Region will be isolated as will the ultimate areas of the State which benefit from the expenditure.

STATUS

A report has been submitted and is being considered by GBRMPA.

The report focuses on economic activity in the Townsville and Rockhampton economic regions to complement areas already covered by economic impact analysis (see Research Projects 97 and 100). Updated Capricornia Section data was incorporated into the Rockhampton economic region analysis. A separate summary volume presents input-output multipliers for four economic regions of the entire Great Barrier Reef Region.

Evaluation of the Travel Cost Method for Estimating Recreation Use Values of Public Amenity Resources such as Sites on the Great Barrier Reef

PERIOD: 1982 — 1983

ORGANIZATION: University of New South Wales, School of Economics

PROJECT LEADER: Mr R.K. Sloan

PROJECT OFFICER: Dr J. Dunn

SUPERVISOR: Dr D. Gallagher

FINANCIAL SUPPORT: GBRMPA Augmentative Research Grant — \$729

OBJECTIVES

To assess the empirical relevance of theoretical work on the travel cost method (TCM) which indicates it may be inappropriate for establishing a site value when it is used in different ways by various visitors.

IMPLICATIONS/MANAGEMENT NEEDS

The TCM is the most widely used method for evaluating recreation sites. This study will add to the understanding of recreation site valuation procedures.

METHODOLOGY

Data on the TCM will be collected using an appropriate questionnaire distributed at Heron Island.

Data collected will also provide socio-economic profiles, delineation of use categories, and identification of the most valued attributes of a site.

STATUS

Report to GBRMPA due December, 1983.

LOCALITY: Capricornia Section — Heron Island

PERIOD: Apr 1983 — Nov 1983

ORGANIZATION: Institute of Applied Social Research,
Griffith University

PROJECT LEADER: Mr T. Hundloe

PROJECT OFFICER: Ms S. Driml

SUPERVISOR: Dr J. Kermond

FINANCIAL SUPPORT: GBRMPA — \$5,000

OBJECTIVES

To compile information on fisheries economics collected by the Institute of Applied Social Research into a single volume for publication.

IMPLICATIONS/MANAGEMENT NEEDS

Information on fisheries economics is required to evaluate the economic impact of zoning and management of Marine Parks.

METHODOLOGY

Information on the economics of commercial, recreational and charter boat fishing has been gathered by the consultant by interview and mail questionnaire. The data have been analysed and the results have been presented in a number of reports to the Great Barrier Reef Marine Park Authority. This project involves editing and interpreting the data and preparing a single volume on the entire Great Barrier Reef Region for publication.

STATUS

Final report to GBRMPA due November 1983.

A Study of the Decision-Making Behaviour of Day Visitors to the Great Barrier Reef Marine Park.**PERIOD:** 1983**ORGANIZATION:** University of New England, Department of Geography.**PROJECT LEADER:** Mr N. Whitem**PROJECT OFFICER:** Ms S. Driml**SUPERVISOR:** Dr J.J. Pigram**FINANCIAL SUPPORT:** GBRMPA Augmentative Research Grant — \$720**OBJECTIVES**

To determine demographic and socioeconomic characteristics and motivations of day visitors. To obtain information on visitor perception, awareness and expectations related to the visit to the Reef Region. To use the information to compare decision-making behaviour of day visitors to Beaver Cay (reef) and to Dunk/Bedarra Islands (continental islands).

IMPLICATIONS/MANAGEMENT NEEDS

This study is designed to improve understanding of the differences day visitors perceive between coral cays and continental islands and of the factors and processes which influence the destination decisions of day visitors. It should also suggest ways in which numbers and types of visitors may be redistributed through time and space so as to foster a broader appreciation of the attractions of cays and islands.

METHODOLOGY

Questionnaires will be distributed to samples of visitors to Beaver Cay and Dunk/Bedarra pre and post visit.

STATUS

Project underway.

LOCALITY: Cairns Section — Beaver Cay,
Dunk Island, Bedarra Island.

7 MANAGEMENT STRATEGIES

108

Demonstration of SIRO-PLAN in the Cairns Section

PERIOD: Dec 1981 — Apr 1982

ORGANIZATION: CSIRO, Division of Land Use Research

PROJECT LEADER: Dr D. Cocks

PROJECT OFFICER: Mr D. Claasen

SUPERVISOR: Dr J. Kermond

FINANCIAL SUPPORT: GBRMPA — \$5,000

OBJECTIVES

To demonstrate the SIRO-PLAN land-use planning method in developing SIRO-PLAN draft zoning plans for the Cairns Section, to support the zoning plan development procedures normally used by GBRMPA.

IMPLICATIONS/MANAGEMENT NEEDS

This study should assist in drawing up draft zoning plans through the digestion of diverse multiple data sets. It can illustrate the effect of different strategies on the draft zoning plan.

METHODOLOGY

The steps proposed to meet the objectives are: (i) specification of zoning categories and policies; (ii) specification of policy satisfaction indicators and data needs; (iii) completion of planning base map and data acquisition; (iv) completion of the computer program and production of discussion plans.

STATUS

A report has been submitted and is being considered by GBRMPA.

A successful demonstration of the technique was accomplished.

LOCALITY: Cairns Section

10 MECHANICS OF INFORMATION TRANSFER

117

Australian Marine Research in Progress

PERIOD: July 1982 — June 1983

ORGANIZATION: Victorian Institute of Marine Sciences

PROJECT LEADER: Mr J. Thompson

CONSULTATION AND LIAISON: CSIRO, Central Information and Library Editorial Service
Department of Science & Technology (DOST)
Ms H. Penridge, JCU

PROJECT OFFICER: Dr W. Craik

SUPERVISOR: Dr A. Gilmour

FINANCIAL SUPPORT: GBRMPA — \$14,706

OBJECTIVES

To produce a second hard copy of AMRIP (Australian Marine Research in Progress), a book form of computer stored information on marine research projects in Australia.

IMPLICATIONS/MANAGEMENT NEEDS

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

Nationally distributed questionnaires on Research in Progress are used in gathering information for editing and classification, data entry, printing.

Development of an interactive system is proposed for 1983-84.

STATUS

The second hard copy of AMRIP is now being produced.

PERIOD: May 1982 — Dec 1982

ORGANIZATION: CSIRO, Division of Computing Research
GBRMPA

PROJECT LEADER: Dr D. Abel

SUPERVISOR: Dr A. Gilmour

FINANCIAL SUPPORT: GBRMPA — \$6,000

OBJECTIVES

To produce an on-line, interactive bulletin of research-related information. This is a pilot study.

IMPLICATIONS/MANAGEMENT NEEDS

This project should eventually result in a readily accessible up-to-date source of information being available on all research activities relating to the Great Barrier Reef Region and other areas of Australia.

METHODOLOGY

The development of specifications for the bulletin was undertaken and software to produce the bulletin is being prepared. Potential users are being surveyed to evaluate potential use before implementation.

STATUS

Pilot testing of the system has been completed and the system is being developed further.

APPENDIX D

FINANCIAL STATEMENT

GREAT BARRIER REEF MARINE PARK AUTHORITY STATEMENT OF RECEIPTS AND PAYMENTS FOR THE PERIOD OF 1 JULY 1982 TO 30 JUNE 1983

	1982-83	1981-82
Cash at bank and on hand 1 July	\$ 222 361	\$ 176 242
RECEIPTS		
Appropriation from the Commonwealth Government (2)	3 253 800	2 190 500
Day-to-day Management — Queensland Government contribution (2)	191 387	60 800
Sale of promotional material	3 949	5 167
Other receipts (3)	7 675	1 030
	3 679 172	2 433 739
PAYMENTS		
<i>Operational</i>		
Expenses of Chairman and Members (4)	106 880	98 380
Expenses of Great Barrier Reef Consultative Committee (5)	24 033	16 515
Salaries and allowances	1 119 784	840 680
Administrative expenses		
Travel and subsistence	144 044	124 538
Office requisites	24 837	29 118
Postage and telephones	98 289	123 457
Office services	109 237	115 285
Computer services	62 260	24 452
Library services	18 247	14 733
Advertising	22 026	36 225
Recruitment expenses	15 883	29 225
Operating costs — equipment	29 170	25 997
Incidentals	33 178	23 652
Research and monitoring	276 854	188 635
Planning	27 396	7 445
Education/Information	221 142	170 140
Park Management (6)	477 250	—
Day-to-day management		
Capricornia Section (2), (7)	382 775	121 600
	3 193 285	1 990 077
<i>Capital</i>		
Automatic data processing	25 928	42 948
Furniture, fittings and display equipment	30 925	60 458
Office machines	81 555	11 511
Audio-visual and photographic equipment	10 108	2 956
Marine and diving equipment	1 968	—
Vehicles and other equipment	5 779	2 428
Day-to-day management		
Capricornia Section (2), (7)	38 683	101 000
	194 946	221 301
Cash at bank and on hand 30 June	290 941	222 361
	3 679 172	2 433 739

STATEMENT OF CAPITAL ASSETS (AT COST) AS AT 30 JUNE 1983

	1982-83	1981-82
	\$	\$
Automatic data processing	77 620	42 948
Furniture, fittings and display equipment	189 950	116 624
Office machines	174 763	89 203
Audio-visual and photographic equipment	43 682	33 860
Marine and diving equipment	40 830	39 452
Vehicles and other equipment	27 874	22 250
Capital items — Capricornia Section (7)	125 938	95 283
	680 657	439 620

NOTES TO AND FORMING PART OF THE FINANCIAL STATEMENTS
FOR THE YEAR ENDED 30 JUNE 1983

NOTE (1) Accounts are kept on a cash basis. Expenditure in the year did not at any time exceed 1982/83 estimates approved by the Minister. Receipts from the Queensland Government and from other sources were not included in the initial approval from the Minister, but were the subject of subsequent approval.

NOTE (2) Day-to-day Management — Capricornia Section

- Day-to-day Management of the Marine Park is undertaken by Queensland Government agencies, which are subject to the Authority in performing this function.
- The Great Barrier Reef Ministerial Council at its second meeting determined that there should be drawn up a legal agreement between the Commonwealth and Queensland Governments defining the detailed arrangements for the day-to-day management of the Marine Park. This agreement would incorporate financing and accounting procedures.
- At subsequent meetings Ministerial Council:
 - endorsed a Basis of Agreement between the two Governments which defined the relative responsibilities for day-to-day management and delineated principles and policies for preparing detailed day-to-day management specifications and procedures;
 - endorsed for the Capricornia Section a cost-sharing arrangement between the two governments which, in effect provides that the Commonwealth funds an agreed initial capital works program in the first three years and that all other agreed costs are shared 50:50.
- An agreement is being drafted, based on the Basis of Agreement, practical experience and further decisions of Ministerial Council. It will also provide for the same arrangements for all Sections of the Marine Park, subject to annual review of expenditure.
- The Commonwealth appropriation included \$230 000 for recurrent day-to-day management expenses in 1982/83. \$191 387 was expended, with the balance of \$38,613 carried forward as cash towards 1983/84 commitments.
- The Commonwealth appropriation included \$110 000 for the initial capital works program. \$38 683 was expended. The balance of \$71 317 plus an amount of \$12 200 carried forward from 1981/82 have been committed by Queensland National Parks and Wildlife Service but payment by the Authority to the Service is pending resolution of a legal issue. These amounts are also included in cash carried forward.

NOTE (3) Includes an amount of \$3 158 from UNESCO, Division of Marine Sciences, for the preparation of a Coral Reef Management Handbook.

NOTE (4)	This item comprises	1982-83	1981-82
		\$	\$
	Remuneration and Allowances — Chairman		
	and part-time Members	61 513	58 228
	Travel and Subsistence	38 143	34 926
	Other Expenses	7 224	5 226
		106 880	98 380

NOTE (5)	This item comprises	1982-83	1981-82
		\$	\$
	Fees	6 148	2 970
	Other expenses	17 885	13 545
		24 033	16 515

NOTE (6)

By agreement between agencies concerned, the Authority contributed \$467 393 under Commonwealth contracts for aerial surveillance in the Great Barrier Reef Region. Park Management is now a separate section in the Office of the Great Barrier Reef Marine Park Authority and incurred expenditure other than on coastal surveillance and day-to-day management e.g. consultancies, photographic services. In previous years these costs were included under Education/Information.

NOTE (7)

Queensland National Parks and Wildlife Service, Statement of Receipts and Payments for the Year Ended 30 June 1983, Day-to-day Management, Great Barrier Reef Marine Park, Capricornia Section.

	1982-83	1981-82
	\$	\$
The Balance at 1st July was	53 652	—
Receipts for the year were —		
For recurrent costs	382 775	121 600
For capital works and services	38 683	101 000
Total Receipts (a)	421 458	222 600
From which the following payments were made —		
Salaries and on-costs	170 974	—
Operating costs (b)	203 762	73 665
Capital works and services (c)	30 655	95 283
Total Payments	405 391	168 948
Resulting in an Excess of Receipts over Payments	16 067	53 652
Leaving a Balance at 30th June	69 719	53 652
Balance at 30th June comprised —		
Recurrent costs	55 974	47 935
Capital works and services	13 745	5 717
	69 719	53 652

NOTE (a)	Funds received from the Authority during the year were provided from the following sources:—	1982-83	1981-82
		\$	\$
	Commonwealth Government	230 070	161 800
	Queensland Government	191 388	60 800
		<u>421 458</u>	<u>222 600</u>

NOTE (b)	Operating Costs†*	1982-83	1981-82
		\$	\$
	Air travel	15 397	4 467
	Travel allowance	18 620	3 922
	Vessel charter	1 500	6 898
	Air surveillance	41 295	12 722
	Vessel running expenses	18 391	99
	Motor vehicle running expenses	4 971	15
	Office supplies	3 774	26
	Appointment expenses	6 846	—
	Rates services and rental	23 725	—
	Photocopying and printing	2 629	3 247
	Library	1 804	759
	Conferences and training	552	50
	General operating expenses	34 777	28 370
	Monitoring	6 616	—
	Photographic materials and processing	3 605	3 090
	Temporary accommodation:		
	Rental — Heron Island	5 000	—
	Furniture and fittings	6 500	10 000
	Professional fees	7 760	—
		<u>203 762</u>	<u>73 665</u>

NOTE (c)	Capital Works and Services†*	Funded by Commonwealth	1982-83	1981-82
			\$	\$
	Vessels and associated equipment	50 209	2 200	48 009
	Vehicles	23 590	8 539	15 051
	Diving gear	11 623	9 566	2 057
	Audio-visual and interpretation equipment	11 188	5 418	5 770
	Air compressor	3 496	3 496	—
	Plant and equipment	3 218	841	2 377
	Moorings	2 083	595	1 488
	Building lease	13 000	—	13 000
	Monitoring Facilities	7 531	—	7 531
			<u>30 655</u>	<u>95 283</u>

† The assets and plant and equipment are subject to periodic stocktakes and procedures and controls set out in the Treasurer's Instructions.

* Due to the reclassification of some accounts the amounts for 1981-82 have been adjusted to effect valid comparison with current year's figures.

We certify that in our opinion and subject to agreement between the Commonwealth and Queensland Governments for day-to-day management and control and ownership of assets, the foregoing Statement of Receipts and Payments is correct and fairly sets out the financial transactions of the Great Barrier Reef Marine Park Authority — Capricornia Section for the period 1st July 1982 to 30th June 1983 on a basis consistent with that applied in respect of the financial year last preceding. The receipts and expenditure of moneys was in accordance with the approved program.

J.A. HALLIDAY
Acting 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 — Capricornia Section, and have obtained all the information and explanation that I have required. The foregoing Statement of Receipts and Payments is in agreement with those accounts and in my opinion has been properly drawn up so as to present a true and fair view of transactions for the period 1st July 1982 to 30th June 1983 on a basis consistent with that applied in respect of the financial year last preceding.

P.N. CRAVEN
Auditor-General of Queensland

In our opinion, the above Statement of Receipts and Payments and Statement of Capital Assets (At Cost) have been properly drawn up so as to show fairly the financial transactions of the Great Barrier Reef Marine Park Authority for the year ended 30 June 1983.

ALISTAIR J. GILMOUR
Executive Officer

GRAEME KELLEHER
Chairman

APPENDIX E

AUDITOR-GENERAL'S REPORT

The Honourable the Minister for
Home Affairs and Environment,
Parliament House,
CANBERRA ACT 2600

16 September 1983

Dear Sir,

GREAT BARRIER REEF MARINE PARK AUTHORITY

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 my report financial statements for the year ended 30 June 1983 comprising a statement of receipts and payments, a statement of capital assets (AT COST) and accompanying notes.

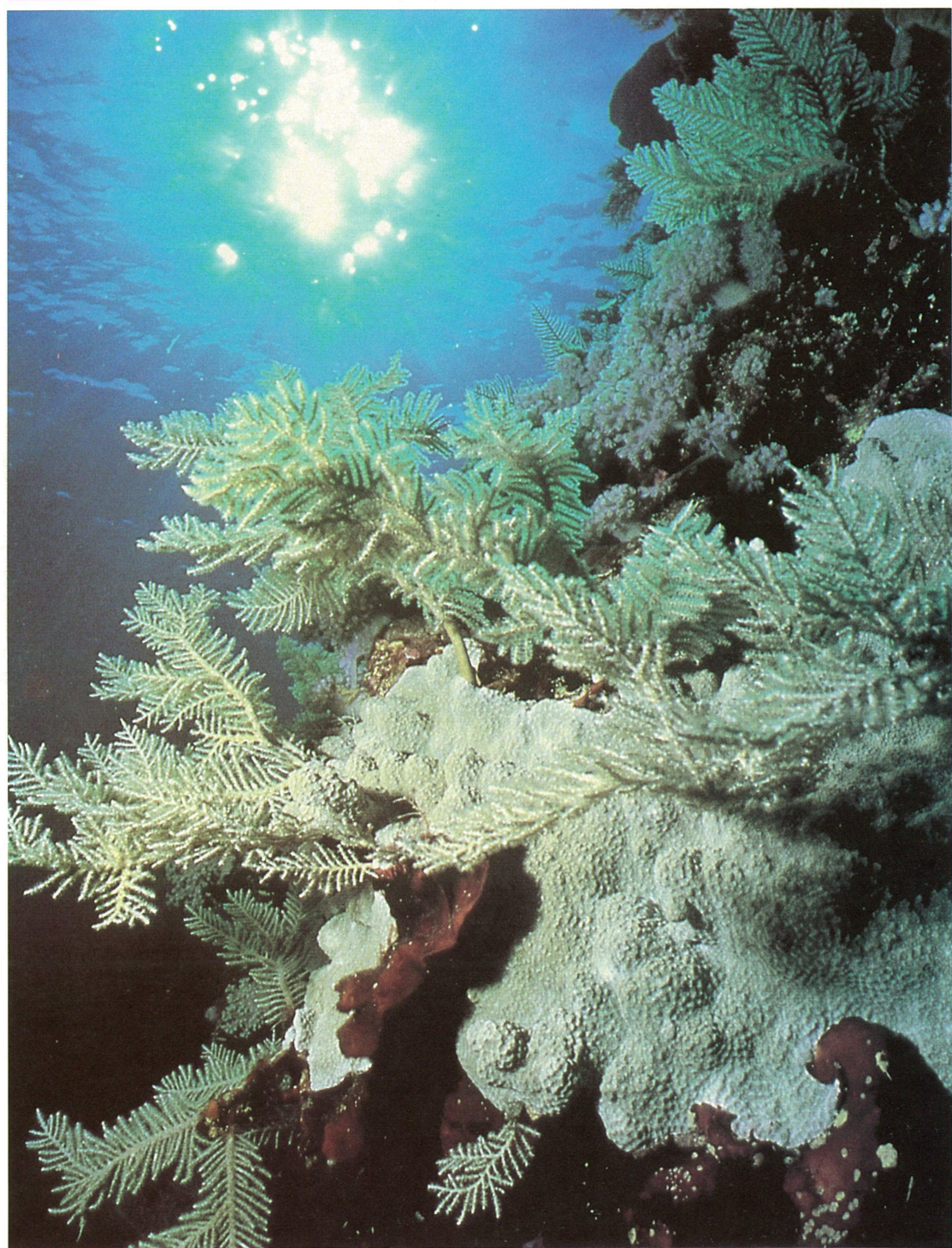
The statements are in the form approved by the Minister for Finance under sub-section 60(1) of the Act. A copy of the statements is enclosed for your information.

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
- 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 except to the extent indicated in the certificate by the Director and an officer of the Queensland National Parks and Wildlife Service in Note 7.

Yours faithfully,

P. J. HINCHY
Acting First Assistant
Auditor-General





GREAT BARRIER REEF MARINE PARK AUTHORITY
P.O. Box 1379,
Townsville, Qld. 4810
Telephone (077) 71 2191

November 1983

