

# Reeflections

Newsletter of the Great Barrier Reef Marine Park Authority,  
P.O. Box 1379, G.P.O., Townsville, Queensland, 4810

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## The Great Barrier Reef

The grandeur and mystique of the Great Barrier Reef has beckoned visitors since the beginning of this century. Originally it was the mecca for fishermen only, but gradually its popularity has expanded. Today, a never-ending stream of visitors seeks the Great Barrier Reef for adventure, relaxation or a total holiday experience.

Some prefer to be alone; others want a gay social life. Some search for a place to idle away hours in the sun; while others want activity . . . swimming, cruising, reef expeditions, water-skiing, boating, hiking, coral fossicking or fishing. A number of visitors like to relax in the shade of palms and tropical trees but many prefer to roam through island national parks or clamber the rocks on oyster raids. Some places are a haven for the weary to relax and rest. The Great Barrier Reef offers it all.

Visitors can enjoy a swim in the reef lagoons or in the resort pools. Scuba divers and snorkellers can experience the wonder of the coral gardens whilst others can view the underwater world from glass-bottomed boats or at the underwater observatories at Green and Hook Islands. For the photographer, there is an abundance of colourful fish and bird life and the nesting grounds of turtles and sea birds on numerous coral cays. For the fisherman — coral trout, cod, red emperor, snapper, parrot fish, sweetlip, bonito, trevally, turrum, groper, barracuda and sailfish abound and the great marlin herd challenges the international and Australian big game fisherman from September to December.

At low tide the fascination of the reef attracts the visitor to go fossicking for specimens of marine life which may be left behind in coral pools, waiting for release with the next tide. Reef walkers are asked not to disturb the sea creatures and to replace carefully the pieces of coral and rock which provide their hiding place.

Of highest appeal for some tourists is a cruise through the waters of the Great Barrier Reef following the wake of Captain James Cook's remarkable Voyage of Discovery in 1770, which passed through Whitsunday Passage and Hinchinbrook Channel.

The Great Barrier Reef is becoming of increasing interest to overseas visitors. For example, Heron Island, which has a specific interest for divers, estimates that 50 per cent of its patronage comes from overseas. Other resorts show overseas figures somewhat below this mark but consistent promotion abroad is expected to lift considerably their percentage in the near future. Within Australia the greatest number of bookings at the major island resorts originate from Sydney but during the winter months of July and August, Victorians predominate.

### Mr J. Wilson

Mr Wilson has been Director-General of Tourist Services in Queensland since 1961. He is also a member of the Great Barrier Reef Consultative Committee.

### Natural History Associations on the Reef

Natural History Associations, similar to those already established at the Lamington, Tambourine, Maijala and Bunya Mountain National Parks are gradually being established by the Queensland National Parks and Wildlife Service in the Great Barrier Reef. One has already been established on Magnetic Island and arrangements are being made, in close co-operation with the resort management and the local scientific research station, for another association to get underway at Heron Island in the very near future. By becoming a member of one of these associations, visitors to the Reef will be able to deepen their understanding of the natural environment and to continue their association with the National Parks after they return home from their holidays.

**Inquiries:** Queensland National Parks and Wildlife Service, P.O. Box 190, North Quay, Qld. 4001.



Peaceful, unspoilt beauty of the Great Barrier Reef.

Photograph: K. Gillett

# Research and Investigations

**Reef fish.** In Queensland the Fisheries Service is currently investigating the effects of overfishing on reef-fish communities. Research into the movements and numbers of commercial reef-fish will involve the use of TRIP (a Tethered Remote Instrument Package) designed and built for that Service. This underwater robot sled has a number of research capabilities that include wide-angle television; a still camera capable of taking 1500 exposures; instruments to measure temperature, salinity and light penetration; and a biological sampling device.

Research in the southern part of the Barrier Reef in the Capricorn Group was initiated in 1971 to provide basic information about coral trout. This suggested that the number of coral trout in a given area of reef slope varied somewhat from place to place but averaged about 68 fish per hectare under natural conditions. Work by the Queensland Fisheries Service has indicated that in some areas subject to regular commercial fishing the numbers may drop to about 35 fish per hectare but fishing remains productive.

Mr A. J. Peel

Mr Peel is Director of the Queensland Department of Harbours and Marine and is a member of the Great Barrier Reef Consultative Committee.

# News from the Authority

**New Minister.** Following the Federal elections last December, the new Minister for Environment, Housing and Community Development, the Hon. Mr R. Groom, has assumed responsibility for the Authority. Mr Groom is the member for Braddon, Tasmania and was elected to the House of Representatives in 1975.

**Meetings.** On 19 and 20 September the Authority and the Consultative Committee held their meetings in Mackay and in the evenings a reception for local citizens and an informal public meeting were held. A visit to Brampton Island was arranged and members inspected the fringing reefs around the island. On 6-7 December the Authority met in Canberra.

**Public Participation Study.** During September Ms Susan Young, a public participation consultant conducted survey work on behalf of the Authority in Rockhampton and Bundaberg. This work together with discussions and contacts established in Gladstone has led to the formulation of advice on the most effective ways of involving the public in the planning of the Marine Park.

**Pesticides.** The vast size of the Reef has spawned a host of myths and preconceived ideas concerning reef conservation.

Unfortunately few hard facts have been available to either dispute such ideas or agree with them. Recently, work carried out by the Tropical Marine Pollution Group at the Australian Institute of Marine Science in Townsville has come up with some significant findings. Very low, but measurable, concentrations of pesticides of the persistent chlorinated hydrocarbon type are present in some organisms of the outer Great Barrier Reef. Insufficient is known of the physiological and ecological effects of these substances, particularly at low concentrations, to give an indication whether any detrimental effects have occurred. But it is significant that these substances occur in reef organisms and similar substances are used in agricultural and urban areas on the Queensland mainland.

The effects of trace pesticides on the Reef are unknown and can only be guessed at by analogy with investigations conducted elsewhere, mainly in North America and Europe (and often in different environments). Considering the currently available evidence it is likely that trace pesticides on the Reef are having little impact as their concentrations are very low. This neglected area of reef research should be expanded in the near future.

This article was jointly written by Dr D. W. Connell and Dr R. W. Olafson.

Dr Connell is Vice-Chairman of the School of Environmental Studies at Griffith University and is a member of the Great Barrier Reef Consultative Committee. Dr Olafson is Leader of the Tropical Marine Pollution Group at the Australian Institute of Marine Science.

**Staff Activities.** On 20 December 1977 the staff in Townsville moved into the Authority's new headquarters in Flinders Street.

Two staff members, Richard Kenchington and Grant Hawley have been involved in joint surveys with the Queensland Fisheries Service in the Swain Reefs (on the crown-of-thorns starfish) and at Wheeler Reef near Townsville (on reef research methodology). A joint survey was also conducted with the Australian Survey Office for a pilot mapping project in the Capricorn Group. Another staff member, Anne Wallace, spent a week in Gladstone with Ms Susan Young making initial community contacts.

A new staff member is Soames Summerhays, a marine biologist who has worked in most wildlife areas between the Arctic and the Antarctic including extensive work in the coral reef areas in the Galapagos Archipelago, the Indian Ocean and the Pacific. The increase in staff over recent months will add to the Authority's ability to keep in touch with people and events where it counts — on the Reef!

# Correspondence Column

## A major step forward in conservation.

The establishment of the Great Barrier Reef Marine Park Authority has been welcomed by the Queensland Conservation Council as a major step forward in Australian conservation.

The task now facing the Authority is to decide how much of the Reef Region should be included in the Marine Park, in order that the Great Barrier Reef will receive meaningful protection. Unfortunately, the question of how small an area of the Reef represents a self-sustaining unit cannot be answered by present knowledge of reef biology, nor is it likely to be answerable in the next few decades. Some scientists have argued that very large areas, or even the entire Reef Region may be inter-dependent.

The Queensland Conservation Council believes that the entire Reef Region should be included in the Great Barrier Reef Marine Park. No doubt, to many people such a statement implies that the entire area would be closed to shipping traffic, fishing, etc. This would certainly not be the case. While the *Great Barrier Reef Marine Park Act* prohibits oil drilling and coral or silica mining within the Marine Park, the Act's zoning plans provide for the accommodation of continued human use of renewable resources of much of the Reef, although fuller protection can be afforded to special areas.

It is my hope that sizeable areas of the Reef will be zoned as 'marine national park' where the collection of marine organisms will be prohibited. A study group from the Australian Littoral Society recommended that at least 20-25 per cent of the reefs of the Great Barrier Reef Region should be given total protection. It is hoped that such measures would provide 'reservoirs' that would serve to replenish marine life in adjoining reef areas, would provide areas for optimum enjoyment of underwater photography and observation and would also provide scientists with some undisturbed areas from which to monitor the 'well-being' of the Reef.

How much of the Great Barrier Reef receives total protection may well be determined by public opinion. The Great Barrier Reef Marine Park Authority has already shown a strong interest in encouraging public participation, which should serve to ensure that all interest groups and individuals receive fair consideration of their views.

Eddie Hegerl

Mr Hegerl is a member of the Great Barrier Reef Consultative Committee and is the Director of the Australian Littoral Society.

**A Commercial Fisherman's Lament.** Unfortunately, a commercial fisherman's life is not the bed of roses many people believe it to be.

The ocean gives no quarter and none can be asked. As hunters, fishermen develop skills which only experience can teach, or they fail. Such is the mould which develops a fisherman.

The commercial fisherman, if he wants to fish the Reef for a living, cannot consider fishing any of the more accessible reefs because the activities of tourist boats, charter boats and pleasure craft have made many of these areas uneconomic and as some tourists have found, rejuvenation of fish stocks on the Reef is not an overnight occurrence.

Reef fish such as coral trout, cod and others too numerous to mention are not recognised as migratory, but rather are considered to be territorial fish. If their stocks deplete in one area, no travelling school of the same species is liable to arrive to repopulate the area. Commercial fishermen are concerned with the maintenance of fish species and the reef ecology generally and are careful to fish areas only to a limited extent.

Unfortunately, the same cannot be said for tourist boat operators whose money comes from people, and not from the sale of fish. Little or no control is imposed on the tourist with the exception of areas of development that are in the vicinity of tourist resorts.

Lamentably, present scientific investigations appear to commercial fishermen to be aimed at the ecology of the giant clams, triton shells and other exotic reef animals, to the detriment of practical research into such factors as the regeneration of fish stocks. A balance has to be struck purely on economic principles between tourist/amateur fishing and commercial fishing.

If the Reef and its creatures are to remain to be enjoyed by posterity, curbs must be enforced on the activities of tourist/amateur fishermen. It is pointless having reefs with no fish.

A handsome coral trout with its many colours is a spectacle which tourists could find comparable to corals, but which they do not often see, and with present trends will see even less.

**B. Low**

The Authority sees 'Reeflections' as an opportunity for people to express their opinions on issues relating to the Great Barrier Reef. However, the views expressed do not necessarily reflect those of the Commonwealth Government, the Great Barrier Reef Marine Park Authority or the Minister for Environment, Housing and Community Development.

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## Reef Notes

**Pandora Protected.** The 'Pandora', the oldest known wreck on the eastern coast of Australia has been declared an historic shipwreck following its discovery in November by diving teams led by Ben Cropp and Steve Domm and assisted by the RAAF.

The 'Pandora' had been sent out from England to capture the mutineers who had seized the 'Bounty' and cast Captain Bligh and some of the crew adrift. It hit a reef off North Queensland and sank on 17 August 1791.

The *Historic Shipwrecks Act* provides stringent penalties for anyone damaging or interfering with an historic shipwreck. However, the Minister for Home Affairs at his discretion, upon application, may issue permits for exploration or recovery of historic shipwrecks and relics.

**Sea Snake Tagging Program.** Since 1976 Professor Harold Heatwole of the Department of Zoology, University of New England, has been engaged in a sea snake tagging program. The aim of the study is to assess the home ranges, migrations, seasonal and any other movements of sea snakes. The study will also ascertain growth rates in sea snakes. The snakes are individually marked by clipping a numbered metal tag through the tail. Recovery of the snakes along with accurate locality data provides information on their movements.

The two main study areas are the Swain Reefs and the eastern part of the Gulf of Carpentaria. It would be appreciated if anyone observing a sea snake with a tail tag would record the number and the locality as precisely as possible and send such information to Professor Heatwole. Sea snakes are venomous and should only be handled with caution. In the event of dead snakes with tags being found Professor Heatwole would like to obtain the specimen, either preserved or frozen. If a tag is found, this should also be returned with details of its location.

**Inquiries: Professor H. Heatwole, Department of Zoology, University of New England, Armidale, NSW 2351.**

**National Estate Register.** The Australian Heritage Commission, on 17 January 1978 announced its proposal to include the Great Barrier Reef in the Register of the National Estate.

The Register of the National Estate is an inventory of those places, being components of the natural or cultural environment of Australia, that have aesthetic, scientific or social significance or other special value for future generations, as well as for the present community.

The *Australian Heritage Commission Act* provides that Commonwealth Ministers and agencies must not take any action

which would adversely affect any place on the Register unless there is no feasible or prudent alternative, unless all action is taken to minimise damage where there is no such alternative, and unless the Commission is informed and given time to comment. Registration is not directed at the actions of State Government, Local Government, or private owners and institutions.

The Register will be used as a basis for the development of programs to protect, improve, and present properties and places forming part of the National Estate.

A comprehensive Register will take many years to compile and will be a continuing process. All registrations will have the same status irrespective of the time of their entry. There are no gradings between different categories of places on the Register.

**Tourism and the environment.** During 1977 an OECD (Organisation for Economic Co-operation and Development) Group of Experts on Environment and Tourism prepared a work program for a study to determine how the quality of the environment can be preserved while maintaining a profitable level of tourism. This was based on a concern in some countries about environmental degradation associated with tourist development.

Australia has indicated its willingness to participate in this project by carrying out a case study which is to be undertaken by the Authority, the Commonwealth Department of Environment, Housing and Community Development and the Commonwealth Department of Industry and Commerce in co-operation with Queensland Government authorities. The southern part of the Great Barrier Reef has been chosen for the study, as an example of a seaside area where development is essentially still at the planning stage.

**Great Barrier Reef Geoscience Workshop.**

Geoscientists from Australian government institutions and Universities have recently attended a Workshop on the Great Barrier Reef, under the auspices of the Australasian Sedimentology Specialist Group (Geological Society of Australia). The Workshop, held at the University of Queensland, St Lucia, on 6-7 February 1978, focussed on problems of Reef Evolution, Sediment Dynamics and Products, Reef Processes, and Geoscience and Marine Parks. Each session pinpointed outstanding problems in these fields and suggested solutions or the means by which solutions might be found to these problems. The relevance of geoscientific studies to Marine Park management was demonstrated. Proposals and recommendations generated by the Workshop will be published.

# Crown-of-thorns Starfish

## Mr R. Pearson

Ever since the crown-of-thorns starfish problem first arose on the Great Barrier Reef in the early 1960s, the general public has been treated to a confusing array of sometimes sensational claims presented in the media. As a marine biologist I have had extensive field experience with the crown-of-thorns starfish yet I realise that there is still a lot to be learnt about this animal and its role in the coral reef ecosystem. What the publicity has done is to highlight our ignorance of coral reefs. All the same I want to emphasise that no other factor, whether pollution, cyclones or trampling tourists, etc., approaches the current crown-of-thorns infestations in terms of the rapid and extensive destruction of corals on the Great Barrier Reef.

The Great Barrier Reef Region covers a huge area, roughly the size of Victoria, and includes several thousand, usually submerged, coral reefs which make up only a few per cent of the total area. There are a number of problems associated with surveying these reefs and these include difficulties in navigation between reefs, uncertainties with the weather, the problems of visibility underwater and the restricted depths in which divers can make observations.

As a result of limited resources it has only been possible to survey approximately 400 reefs during the last decade and some of these not very thoroughly, especially in the early years. Also, because the crown-of-thorns starfish are very patchy in their distribution both within and between reefs, and their numbers can build up or decline rapidly on a single reef it is possible for observers who have visited the same reef to arrive at quite different conclusions about the starfish populations.

Although the Reef has been in existence for tens of thousands of years, almost nothing is known about the starfish prior to the 1960s. Fortunately geologists may be able to help fulfil this information need. In fact, in sediment samples dating back several thousand years, several peaks in abundance of starfish have been detected by Dr E. Frankel of Sydney University.

This sort of geological evidence, when coupled with knowledge of the life cycle of the starfish and evidence now being accumulated which shows the rapid recovery of many corals on reefs attacked by starfish, indicates to me that the phenomenon is a naturally recurrent one and that coral reefs have adapted to it. Nonetheless, further research is obviously needed.

However, the problem remains as to what, if anything, should be done about the current infestations. Personally, I believe that they should be left alone unless they threaten particular reefs regarded as being important for scientific, historic,

aesthetic or other reasons. Under these circumstances manual control of starfish numbers, as was practised at Green Island in the 1960s, would be feasible and the cost would not be prohibitive.

To those who believe that the size of the present crown-of-thorns starfish populations have been caused by man's interference in the coral reef ecosystem, all I can say is that their argument needs to be far more convincing to the scientific community. The size of natural fluctuations in the abundance of the vast majority of coral reef organisms are simply not known, let alone those which might have resulted from man's activities.

Mr Pearson is employed as a marine biologist with the Queensland Fisheries Service in Cairns.

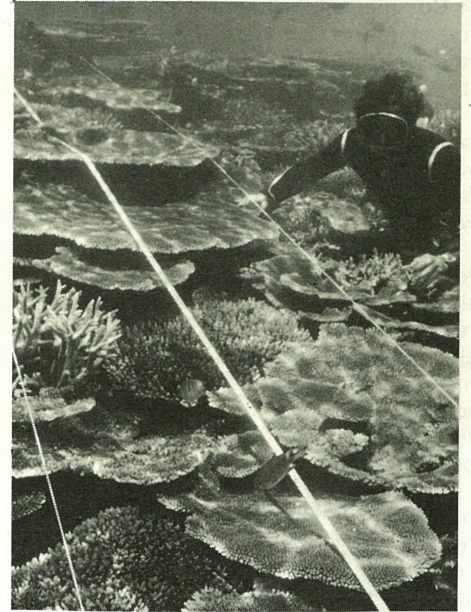
## Dr R. Endean

Only two research groups have been directly involved throughout the last decade in monitoring the progress of the crown-of-thorns starfish infestations of reefs of the Great Barrier Reef.

One group led by Mr R. Pearson has carried out studies on behalf of the Queensland Government since 1966. Last year he was reported as stating (*Australian Fisheries*, 35(4), 22, 1976) that 'in the central region' (of the Great Barrier Reef) 'of the 134 reefs examined 64 carried starfish aggregations and on 50 of these coral mortality was estimated to be more than 50 per cent'. It can be expected that the ratio of uninfested to infested reefs would be similar in the cases of those reefs in the region that were not examined. It can also be expected that the extent of coral damage on infested reefs that were not examined would be similar to that found on infested reefs that were examined. On this basis a total of well over 100 reefs where coral mortality was in excess 50 per cent is obtained for the region.

Pearson's data are entirely in accord with the results of the surveys carried out since 1966 by research workers under my control. These surveys indicate that the hard coral cover of approximately 180 of the 300 or so discrete reefs of the central region (lying between the latitude of Port Douglas and Ayr) has been extensively damaged by the crown-of-thorns starfish during the last decade.

With respect to recolonization of hard coral on reefs that have been devastated by the crown-of-thorns starfish, Mr Pearson estimates (*Australian Fisheries*, 35(5), 16, 1976) that it would take a minimum of ten years for the recovery of fast-growing branching species and a minimum of 20 to 50 years for the slow-growing massive species. However, the possibility must be entertained that recolonizing reefs could be invaded by the



Coral regeneration on Ellison Reef. Ten years ago this area was completely destroyed by the crown-of-thorns starfish. Photograph: R. Pearson

crown-of-thorns starfish at any stage during the recovery period. Be this as it may, these data are in agreement with my own published estimates of recovery times and reveal clearly the extent of the catastrophe that has already befallen reefs in the central region of the Great Barrier Reef. Moreover, both research groups agree that the crown-of-thorns starfish infestations have recently spread to reefs in the southern sector of the Great Barrier Reef.

The causes of the starfish population explosions on the Great Barrier Reef are unknown and there has certainly been disagreement on the causes. My own view is that the population explosions have been triggered by the extensive collecting by humans of fishes and molluscs, particularly the groper and the giant triton which are predators of juvenile and small adult crown-of-thorns starfish. However, the damage inflicted on the hard coral cover of reefs by the crown-of-thorns starfish infestations is usually so severe and so long-term that, irrespective of their origin, the infestations should be controlled.

Dr Endean is a Reader in Zoology at the University of Queensland.

Editor. Unfortunately due to space limitations it has not been possible to publish all the articles which were received on the crown-of-thorns starfish.

New Address and Telephone Number  
The Authority's Headquarters are now located in the Commonwealth Bank Building, 370 Flinders Street, Townsville and the postal address is P.O. Box 1379, G.P.O., Townsville, Qld. 4810. The new telephone number is (077) 71 2191.