NEWSLETTER OF THE RESEARCH AND MONITORING SECTION

REEF RESEARCH

Great Barrier Reef Marine Park Authority

VOLUME 2 – No. 1 MARCH 1992

EDITORIAL

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Researchers note - the lead article of this issue is particularly relevant at this time of the year since this is the period during which we evaluate proposals for support in the 1992/93 financial year. One hopes the article will provide guidance for scientists approaching the Authority for funding either now or in the future. All potential "fundees" should note the importance of a management orientation for research.

The rest of this issue is something of a mixed bag but for my money (mind you the Newsletter is free) the article on video transect monitoring is of greatest interest. With this developing methodology we can remove much of the inter and intra variability of observers from the field to the laboratory allowing much more stringent testing. The method is fast, repeatable, relatively cheap and, I believe, offers much for the future of monitoring of the benthos on most spatial and temporal scales. As microcomputers become more powerful and cheaper this kind of approach to data collection and analysis is bound to become more valuable and widespread.

I am told the third issue of any new serial is the pivotal point for success or lack thereof. It is at this stage that the test of initial enthusiasm, both on the part of contributors and those involved in preparation, becomes apparent. Enthusiasm, at GBRMPA at least, is still high and seems also to be so out in the world of recipients. It has been most gratifying that this fledgling newsletter has received a suitably encouraging response with extra copies being requested, letters of support or inquiry and some reprinting of articles in other publications. This interest is greatly appreciated.

Ed.

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WHAT'S IN THIS ISSUE

STAFF NEWS

John Robertson – moved from Assistant Project Officer (Monitoring) to Project Manager (Effects of Fishing)

Andy Steven – moved from Assistant Project Officer (Water Quality) to Project Manager (Water Quality)

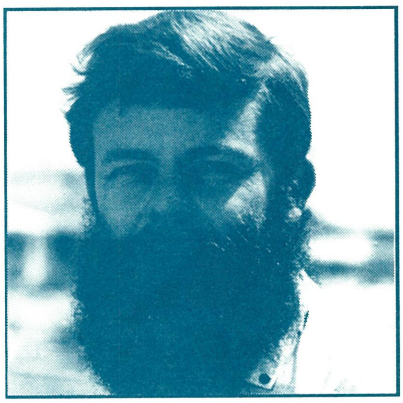
Rob McGill – new Assistant Project Officer (Water Quality)

Viki Bates – new Assistant Project Officer (Monitoring)

WHO'S WHO

Brian Lassig

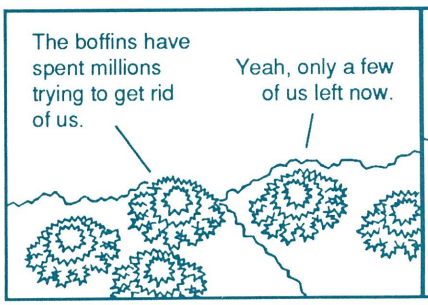
Brian started working on coral reefs 20 years ago through a Masters degree at the University of Queensland. He continued with a doctorate at Macquarie University, playing around with cages and looking at the effects of predation on patch reef fish assemblages. In search of a change and managerial experience Brian then moved into the computer industry where he worked with a variety of companies as account manager and market research consultant. He joined GBRMPA in 1988 as a Science 1 then subsequently became Project Manager with the crown-of-thorns starfish research program. Brian has been coordinator of that program for the past two years. He maintains an interest in most biological and ecological aspects of reef research, particularly those areas with relevance to management.



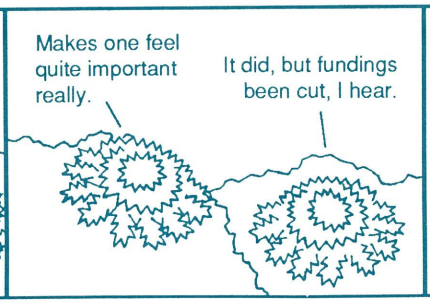
Bruce Mapstone

Bruce Mapstone has been with the Authority since May 1991 and is employed as coordinator of the program of research into the effects of fishing on the GBR. Prior to this position Bruce held a National Research Fellowship and was based in the Department of Marine Biology at James Cook University. He went to James Cook University after completing his PhD at the University of Sydney in 1988. Bruce's doctoral research involved assessment of factors affecting the distribution and population dynamics of a small damselfish on the southern GBR. His post-doctoral research was concerned with scales and magnitudes of variability in populations of organisms on the GBR and how to better design sampling and experimental work to account for such variability. Bruce maintains an ongoing interest in the development and application of statistical methods and design philosophies in quantitative ecology, environmental impact assessment and long term monitoring.

Coralations



Thorny Responses



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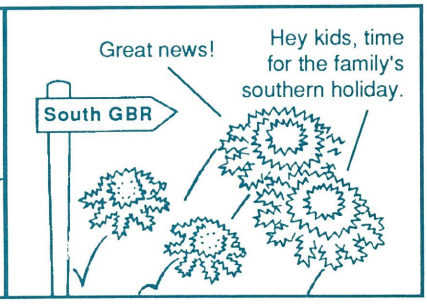


Research and Monitoring Program - What and Why

Simon Woodley

The Great Barrier Reef Marine Park Authority is responsible for zoning and management of the Great Barrier Reef Marine Park. To assist management decisions the Authority undertakes research and monitoring to acquire relevant information and this function of the Authority is established in the Great Barrier Reef Marine Park Act 1975, S.7(1)(b):

> "to carry out, by itself or in cooperation 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."

The Authority is not primarily a research agency and, as a general rule, contracts out research to individuals or institutions with the relevant expertise. Research funded or carried out by the Authority must be relevant to the management of the Great Barrier Reef Marine Park.

Program Aim

The Authority has adopted the following aim in relation to research:

> "To achieve competence and fairness in the care and development of the Marine Park through the conduct of research, and the deliberate acquisition, use and dissemination of relevant information from research and other sources."

Description

This program involves the acquisition, interpretation, dissemination and application of information for key research areas and management issues relevant to the Great Barrier Reef and the establishment and management of both reef-wide and site-specific monitoring programs. The Authority has also been commissioned to manage three programs outside the Great Barrier Reef Marine Park – the Torres Strait Baseline Study, the preliminary environmental assessment into the effects of hydrocarbon exploration in areas adjacent to the GBRMP and the preparation of a report of the State of the Marine Environment of Australia.

Major Information Requirements

The Authorities major information requirements can be grouped into the following three areas:

Resource Analysis -

- biophysical and socio-economic resources
- processes
- synoptic analyses and models

Use and Effects of Use Analysis -

- intensity and distribution of use
- present and future patterns of use
- effects of uses on resources, other uses and values

Information Management -

- collection, storage and retrieval
- application and interpretation

Principles

The following guiding principles are followed as far as possible in the development and conduct of the Authority's research program:

1. *It will be directed towards key issues of relevance to planning and managing the Great Barrier Reef Marine Park.*

2. *It will primarily be carried out by the best available research institutions, government agencies or individual researchers under contract to the Authority.*

3. *Projects and programs will be subject to independent expert peer review prior to commissioning and on completion.*

4. *Projects which involve sampling to test predictions will be designed to allow for statistically rigorous analysis.*

5. *It will be co-ordinated with programs of other research agencies, government agencies and industry to address issues of mutual concern, maximise efficient use of resources and ensure the use of appropriate design and methodology.*

6. *The results of research and monitoring will be published or otherwise disseminated and applied as widely as possible.*

7. *The extent of monitoring required to comply with permit conditions should be related to the predicted degree of environmental risk and potential impacts from the permitted activity. Monitoring programs of permitted activities should be designed to trigger a management response in time to prevent significant impacts occurring.*

8. *Monitoring of the effects of specific permitted operations will be managed by the Authority through the use of consultants at the expense of the proponent.*

THE TORRES STRAIT BASELINE STUDY SCIENTIFIC PROGRAM

Ian J. Dight[1]

The Torres Strait Baseline Study scientific program was instigated in response to concerns about the possible effects of heavy metals from mining developments, particularly those within the Fly River catchment of Papua New Guinea (see also Reef Research 1(1):4-5). The purpose of the scientific program, therefore, is to acquire data that will assist in determining the extent of influence of Fly River discharge and whether there is evidence of contamination from mining operations. The Torres Strait Baseline Study is being managed by the Great Barrier Reef Marine Park Authority.

An evaluation of trace metal impacts on the resources of the Torres Strait will not be a simple task as the region is physically complex, biologically diverse, and poorly understood. The task is made more difficult because there are few data from within the Torres Strait which can be considered as truly 'baseline'; that is, which correspond to pre-mining conditions.

It is important to remember that metals occur naturally in the marine ecosystem and that background concentrations of various metals are a result of inputs from a variety of sources. Rivers draining highly mineralised areas, such as the Fly River system, are a natural source of metals to the marine environment and this poses particular problems with respect to the identification of elevated levels due to mining operations.

The Baseline Study scientific program objectives include:

(1) Establishing the existing levels of trace metals within the Torres Strait.

(2) Identifying the important transport, geo-chemical and trophic pathways of trace metals.

(3) Assessing the affects of present concentrations of trace metals in marine biota on the health of Torres Strait Islanders and Papuans.

(4) Providing the basis for an on-going monitoring program for trace metal concentrations and their effects within the Torres Strait.

Conceptual Design of the Program

Three basic methods will be used to quantify trace metal concentrations in the Torres Strait; analysis of water, sediments and biota. Difficulties and disadvantages associated with the use of water analysis, including extreme temporal variation and low concentrations (which give rise to problems of analytical sensitivity and sample contamination) have directed the major focus during the early stages towards sediments and biota. The sampling of biota will be a particularly important component of the Baseline Study as, ultimately, it is the bio-available fraction of trace metals in the environment which is of concern. It is intended to sample biota of relevance to the community and commercial fisheries, as well as indicator or 'sentinel' species of trace metal bio-availability.

The Fly River catchment is considered as a point source of impact from trace metals on the resources of the Torres Strait and the conceptual design of the sampling program for sediments is illustrated in Figure 1. As such, the study design will seek to identify a gradient of change in a number of parameters related to river discharge away from the mouth of the Fly River. The sampling program will be carried out along five transects and all lie within important habitats and/or along the most likely transport pathways into the Torres Strait. There will be a series of replicate sites per station while replicate samples will be collected from each site. The sampling station is the basic unit against which spatial and temporal trends will be assessed. The final design of the program, including the number of stations and their spacing, could be modified in light of results from a pilot study which is presently underway.

The Pilot Study

The pilot study aims to determine the most effective and cost-efficient sampling strategy for trace metals in sediments and biota, to identify suitable indicator or 'sentinel' organisms, to provide a preliminary assessment of spatial and seasonal variation in trace metal concentrations and to assess the impacts of current levels on human health.

The community sampling program has been underway since May, 1991. Sampling is being carried out in an opportunistic manner by Vic McGrath who has now visited all island communities within the Torres Strait. Food items that have been collected for heavy metal analysis include a variety of reef and pelagic fish, gastropod molluscs and tissues and organs from the green turtle *Chelonia mydas*. It is also intended to sample the dugong, *Dugong dugon*, as this marine mammal is an important component of the diet of some communities. Additional information on food items, including importance, and capture/collection and food preparation methods, is also being collected. Development of a better understanding of the consumption patterns of Torres Strait Islanders, in order to determine intake levels of heavy metals, is essential to an assessment of impacts on human health.

The pilot study sampling program for sediments and indicator organisms is being conducted over two periods: September-October, 1991 (at the end of the trade wind season) and March-April, 1992 (at the end of the monsoon season). Samples are being collected from a subset of the stations that have been identified for the main program, and include eight stations for sediment and nine for biota. The pilot study sampling stations all lie within distinctive physical environments and represent important biological habitats. They are spread across most of the Torres Strait, and are positioned to identify differences in metal concentrations over a number of spatial scales.

The pilot study program also intends to assess various sampling techniques for metals in sediments in order to ensure that the fine surface material is not lost. Observations made during the first sampling trip (September, 1991) indicate that the carbonate content and grain size of sediments can vary markedly from one station to another (and even within some stations). In some areas the physical environment is such that there is very little fine material being deposited, while others are dominated by muds of terrestrial origin. The resuspension of surface sediments by strong tidal currents and surface gravity waves in shallow water may result in an additional source of variation in metal concentrations. The surface five centimetres of sediment samples are being analysed for trace metal concentrations, sediment type (including grain size distribution and carbonate content), and organic carbon content. Samples are being prepared for analysis by chemists at the Australian Nuclear Science and Technologies Organization.

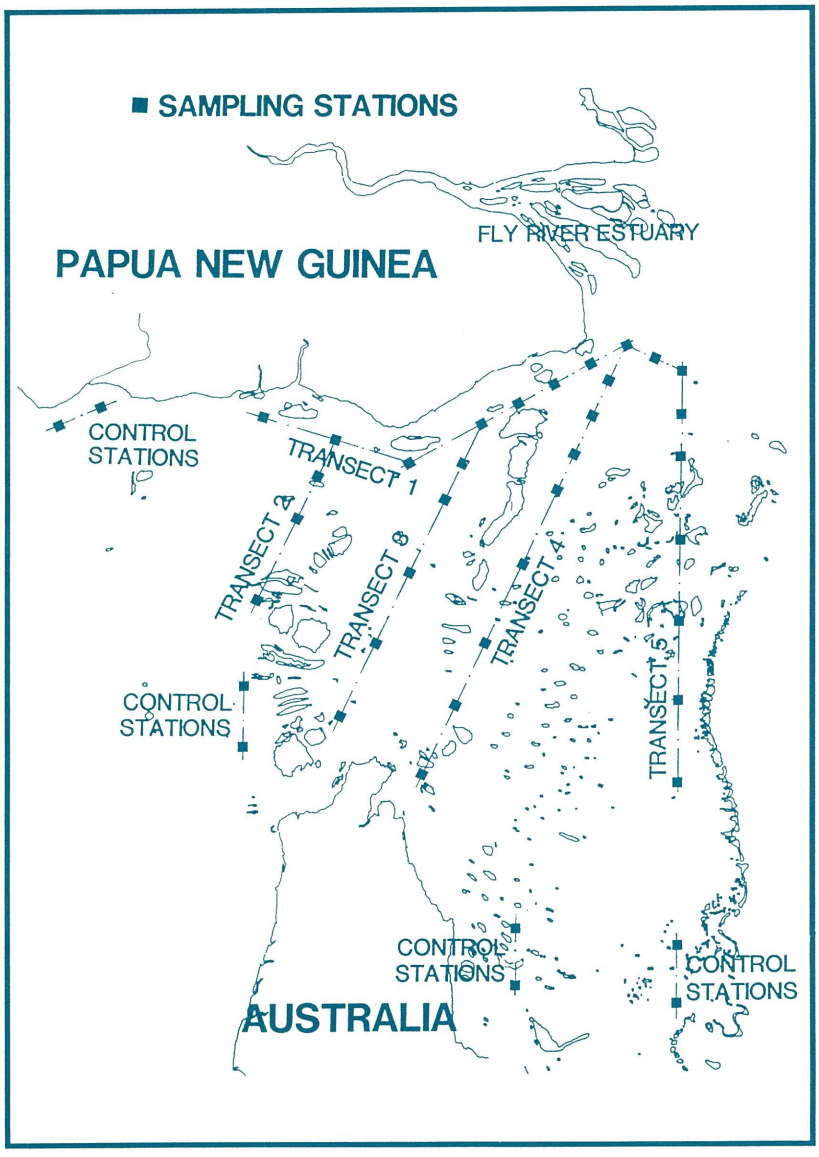


Figure 1.

The first collection trip for indicator organisms (October, 1991), in addition to visiting various reef, inter-reef, and mangrove areas within the Torres Strait, also included a visit to Raine Island. Sediment and biota samples from Raine Island, which is considered to be a pristine environment, will make useful comparisons with

samples collected from similarly located reefs within the eastern Torres Strait. A wide variety of potential indicator organisms were collected during the sampling trip, including four species of seagrass, eight species of bivalve and gastropod mollusc, the holothurian *Stichopus chloronotus*, and the reef fish *Lutjanus carponatatus*. The samples were transported in a fresh condition to the James Cook University Research Station on Horn Island where a team of chemists from the Queensland Department of Primary Industries conducted the necessary dissections and sample preparation.

The Torres Strait lived up to its reputation as a difficult environment in which to work. Strong currents, windy conditions and poor water visibility make sampling difficult at times, but the physical beauty, biological diversity and cultural heritage of the region make it an interesting place to work.

1 Ian Dight is a Research Fellow at James Cook University and Scientific Advisor for the Torres Strait Baseline Study.

ENCORE

RAISING THE NUTRIENT CURTAIN

Andy Steven

The Great Barrier Reef Marine Park Authority has identified water quality as a major environmental issue, and the effects of elevated nutrient concentrations have been the principal focus of this concern. However, management action is difficult to justify or appropriately direct unless quantitative relationships are established between enhanced levels of nutrients and reefal community degradation. Recognising this area of concern, and accepting the need for good unambiguous evidence that the problem is real, the Australian Government has funded the Authority to begin a water quality program of relevant research.

One of the major research initiatives of this program is to repeat and extend the seminal reef fertilization experiment by Don Kinsey at One Tree Island. This new project, named ENCORE (Elevated Nutrients on COral REefs) is a synthesis of two similar projects, one proposed by the Authority, and the other by Professor Tony Larkum of the University of Sydney, funded by an Australian Research Council grant.

The **ENCORE** project will be undertaken at One Tree Reef, in the Mackay/Capricorn Section of the Great Barrier Reef Marine Park. It is anticipated the program will follow a course of a baseline study followed by fertilization and then observation of recovery. The above will all occur over a three year period, hopefully beginning in early 1992. Fertilization is anticipated to commence in February-March 1993, and continue for one year. Broadly the experiment will attempt to partition the effects of nitrogen and phosphorus separately and combined, using as sample units patch reefs or microatolls of similar size and nature and in the vicinity of the original Kinsey project. Parts of each microatoll will be caged to measure whether increased primary productivity results in an increased standing crop of algae and assess the extent to which this is consumed by macro grazers.

A preliminary field trip by an Authority team in November 1991 identified 13 microatolls of similar size, morphology and biological composition, suitable for manipulation (see Figure 1), however only 12 of these will be used. The team also detailed common biota and studied the hydrodynamics within a number of these microatolls.

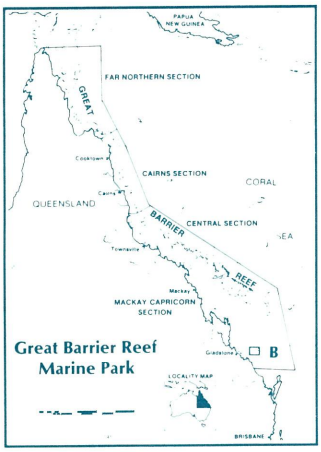
The Authority will fund the logistical framework of the experiment, around which a variety of relevant studies can be based, and will assume a coordinating role for the project. Participation in **ENCORE** is open to all persons/institutions, and this invitation has been extended to the United States and Israeli scientific community, provided they have funding.

The **ENCORE** program will involve at least a dozen Australian funded scientists as principal investigators addressing various aspects of reef response to nutrient enhancement. The suggested research priorities are structured as a set of interlocking questions, each to be answered by a variety of scientific approaches,

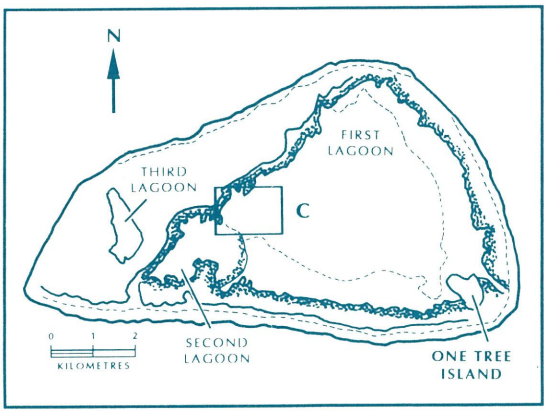
and seeking to identify how organism, population and community parameters respond to elevated concentrations of nitrogen and phosphorus, separately and in combination.

As well as contributing to a greater understanding of how coral reefs respond to elevated nutrient supply, it is hoped this research will develop a number of readily useable, sub-lethal techniques which will allow the detection of stress in coral reef environments in sufficient time for management to respond appropriately.

A. Map showing location of One Tree Reef within the Great Barrier Reef Marine Park.



B. One Tree Reef.



C. North-West Lagoon showing the microatolls (1 - 13) to be used in the ENCORE project.

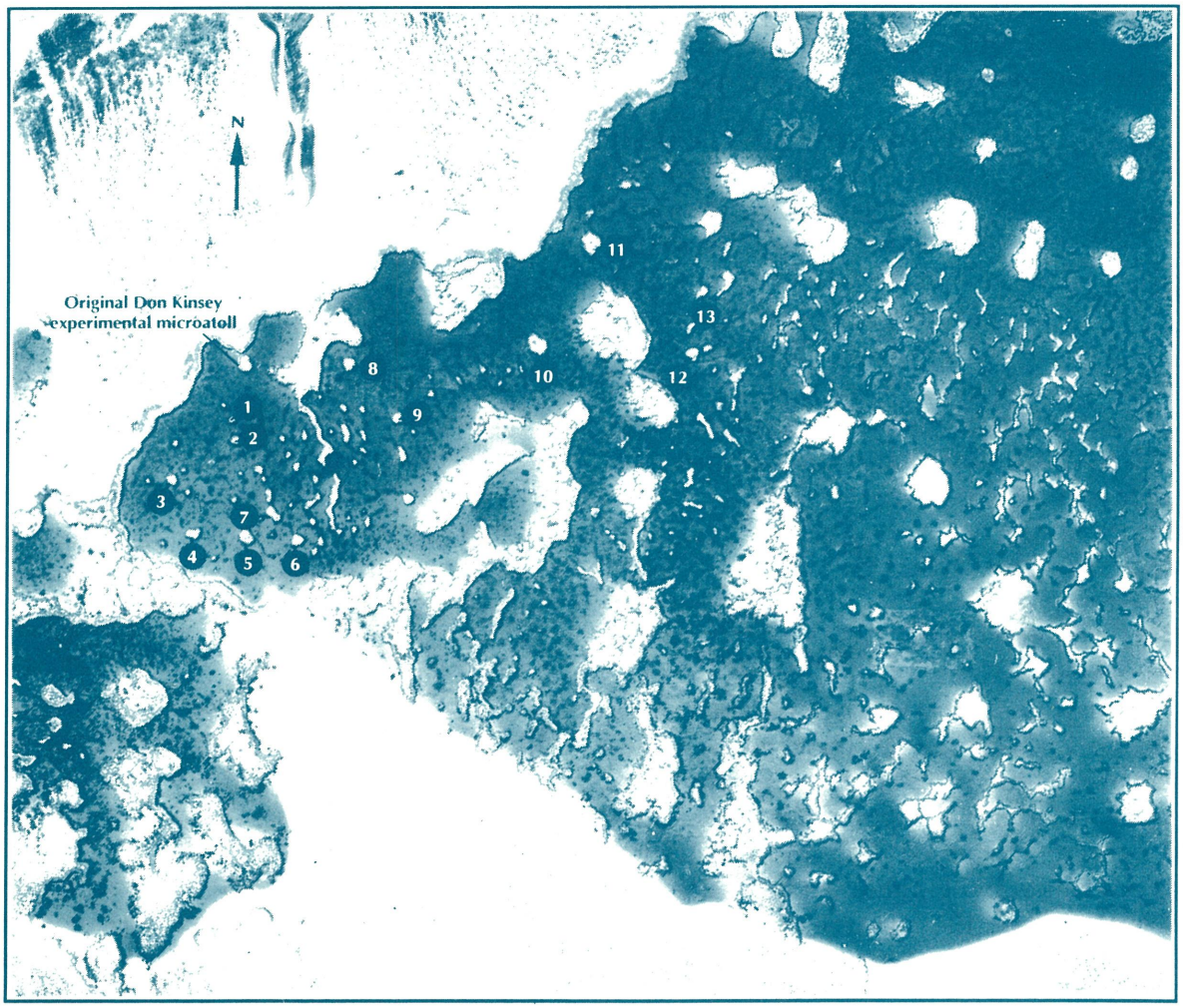
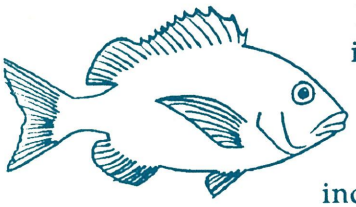


Figure 1.

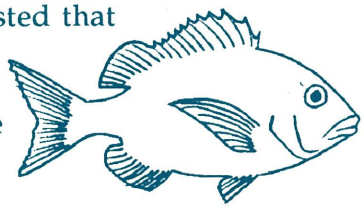
PROGRESS OF
THE EFFECTS OF FISHING PROGRAM

John Robertson

A description of the Effects of Fishing Research Program in the Great Barrier Reef Region was given in Reef Research 1 (1): 8, September 1991. In brief, the long term research program will evaluate the direct and indirect effects on reef communities of recreational and professional line-fishing, inter-reefal trawling and interaction between the fisheries. The experimental research program will be developed by the Authority in close consultation with the Effects of Fishing Advisory Committee. This Committee consists of representatives from Commonwealth and Queensland fisheries management and research organisations, industry and recreational fishing groups.



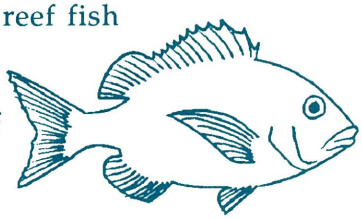
In November 1991, a meeting was convened in Townsville for all interested Commonwealth, State Government and independent researchers to discuss the pilot phase of the large-scale manipulative experiment designed by Walters and Sainsbury to assess the effects of inter-reef trawling and line fishing. Walters and Sainsbury suggested that the pilot study phase of the experiment be mainly aimed at testing some of the assumptions made in the design and refining sampling techniques. The meeting established objectives for 1991/92 and priority areas of research, identified areas of collaboration and overlap, discussed data and intellectual property rights and highlighted key issues and problem areas in the research program. The following objectives were established for 1991/92:



1. To survey before the Cairns Section Zoning Plan comes into effect, the five existing Marine National Park – B reefs to be opened to fishing under the new zoning plan. These reefs have been closed to fishing since 1983.

2. To survey all the other reefs in each of the two Cairns Section clusters of experimental reefs prior to the commencement of other research projects.

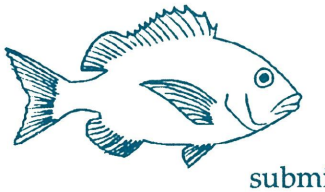
3. To determine the age structure of coral trout and other commercial reef fish populations from one of the closed reefs and one adjacent open reef before the new zoning plan comes into effect.



4. To assess the extent of inter-reef movement of fish species in the reef clusters using tag recapture experiments.

5. To refine and compare monitoring techniques expected to be employed in the Effects of Fishing Program. These include underwater visual census, fish trap designs, line fishing, droplines, deeper water fish traps and spear fishing.

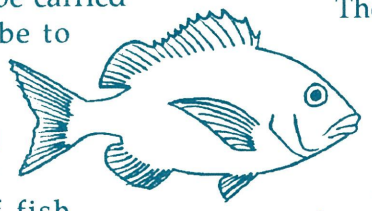
6. To assess differences in larval recruitment between adjacent reefs using larval light trapping methods.



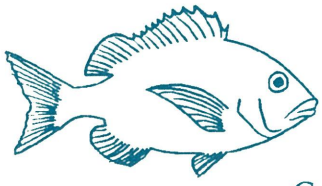
Research proposals for each of the objectives were called for and have been submitted. Objectives 1 – 3 were seen as highest priority and research projects relating to these three objectives were reviewed and two projects are presently underway. Research proposals addressing objectives 4 - 6 are still under review.

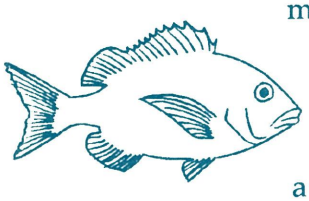
The two projects which have commenced are:

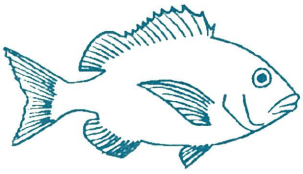
1. Visual Surveys of the Cairns clusters and particularly the closed reefs that will be opened under the new zoning plan.



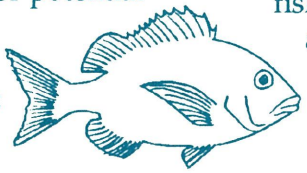
The major aim of the study, to be carried out by Dr Tony Ayling, will be to provide spatial and temporal baseline survey data on large commercially and recreationally targeted reef fish species, such as coral trout, snappers and sweetlips, on the two Cairns Section clusters of reefs and on five Marine National Park – B reefs that have been closed to fishing. All these reefs will be resurveyed 4 -5 months later. There is already previous information from visual counts of target fish species and a range of other organisms on many of these reefs from similar surveys done in early 1991 & 1983. Hence, as well as providing baseline data before experimentation in the Cairns clusters, and some information on short term effects of renewed fishing pressure on reefs that have been protected from fishing for eight years, it will also give an indication of whether density differences in fish populations between reefs are consistent over the medium term in the absence of any fishing or experimental effect.

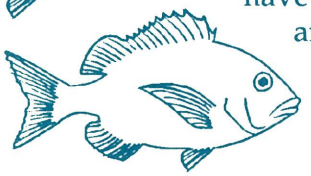






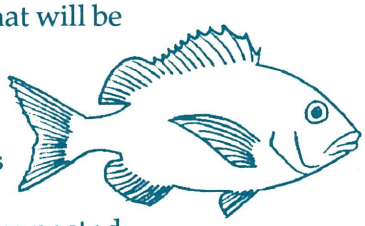
Additional baseline data will also be collected on the density of potential prey species, such as butterfly fish, crown-of-thorns and giant clams; percentage cover of the major encrusting groups such as hard corals, soft corals; and estimates of the damage caused to coral communities by the corallivorous gastropod *Drupella (see Reef Research 1 (2): 6-7 December 1991).*

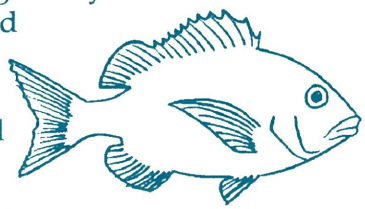




2. Effect of zoning changes on the fish populations of unexploited reefs. Stage I: Pre-opening Assessment.

This study is being conducted by Dr Ian Brown & Mr Lyle Squire of Queensland Department of Primary Industries. The study will take advantage of the unique opportunity of opening up to fishing Marine National Park - B reefs that have been closed for eight years. The age and size structure will be determined for the populations of the main predator fish species on two pairs of adjacent reefs; one reef in each pair which is presently closed to fishing that will be opened under the new zoning plan, and the other that has always been open to fishing. It is expected that the reefs to be opened will receive a significant pulse of fishing effort after opening due to their close proximity to centres where night and day fisheries for reef fish are well established. The study will provide baseline data on mortality rates for the major fish species and, from this baseline data, changes in fishing mortalities on these species populations can be determined when post-opening surveys are conducted six and twelve months later as a part of a separate proposal for 1992-93.





By the end of 1991/92 financial year the Authority will have developed a better understanding of the present state of the fish resources on the experimental reefs as well as indications as to how fishing may change the primary fish resources and secondary effects on other organisms. It will also have addressed the assumptions and refined techniques for the long term study of effects of fishing on the Great Barrier Reef.

R

VIDEO PHOTOGRAPHY

A Quantitative Sampling Method

Ray Berkelmans

There are a number of methods of quantitative sampling available to the benthic ecologist. Among the longest established and most used are the line intercept transect, the belt transect and the quadrat. Still photography has also been used for some time, especially for re-sampling a fixed area. Refinements such as stereo photo pairs and the recent development of a variety of computer image processing, analysis and storage techniques have further improved their utility. In recent years, video photography has also undergone considerable development as a quantitative sampling methodology and is now finding increasing use in benthic ecology.

The Technique

Dr Terry Done (AIMS) has been working with video sampling techniques since 1988 and has developed a relatively simple way of obtaining quantitative estimates of benthic cover on coral reefs. Essentially it involves playing back a video taped transect on a VCR and stopping the tape at random intervals. The cover type which appears directly under a fixed spot marked on the screen is noted and the tape is restarted. The random stops are controlled by an electronic signal fed into the VCR.

Further refinements have been incorporated by Dr Brett Kettle (Sinclair Knight & Partners). He made provision for more of the field of view to be potentially sampled by increasing the number of fixed spots to 6, all evenly spaced on the TV monitor and positioned at each restart. Each spot is numbered and a computer program not only randomly selects the intervals between stops, but also randomly assigns which spot to sample under. The identification of the spot is made by spoken cue from the computer program at each restart and this allows the observer to retain the moving image in his/her mind after the tape stops, thereby overcoming some of the effective loss of resolution in the frozen picture. A set menu of options of cover type appears on the computer screen with each stop and the observer makes the appropriate selection. Data are automatically tallied at the end of the run, % cover is calculated and the data graphed and stored if required.

The use of fixed spots on both the top and the bottom of the TV monitor in the sampling process requires that the video is shot normal to the substrate. Oblique shots introduce parallax error in the field of view and also sample a greater width of transect in the top of the screen compared to the bottom. The video camera is also required to be held at a constant distance from the substrate (a distance rod helps). Transect widths of 1-1.5m are obtainable at 1m distance from the substrate with a standard video camera lens and best results are obtained by swimming at a slow pace (0.2 - 0.5m/s) and holding the camera as steady as possible.

Reliability & Resolution

Done (unpublished data) found that sampling between 115 and 150 spots per 200m transect gave a consistent estimate of benthic cover when identified to broad categories such as hard coral, soft coral, macro algae, other biota, rubble/sand and bare substrate. He has also found that inter-observer variability is relatively low for observers with a modest amount of coral reef experience. Kettle (in prep) repeated the test for inter-observer variability and reached similar conclusions.

The taxonomic resolution to which the cover types can be reliably identified is as yet untested. The broad categories listed above are generally at a safe level of inquiry with this technique, however it may be possible to identify corals further. Dr John Carleton (AIMS) has been working on verifying the identification of corals to 5 growth forms namely, branching, plating, encrusting, sub-massive and massive. Carleton (unpublished data) found that in a comparison of in-situ observations and video taped transects, there was good agreement on most growth forms, but massive corals were easily misinterpreted. Kettle (in prep) is comparing video transects with benthic line intercept transects as part of a monitoring program for a tourist development.

It is generally accepted that the resolution of video photography will never be as good as in-situ observation and is generally also not as good as that of good quality still photography. Video resolution will depend on the water clarity, the amount of natural light and/or use of artificial light, the distance of the camera from the substrate and the video format. To date, nearly all of the trials have been done using natural light and most of them in shallow water. More work on verifying the effective resolution of video technique under a range of conditions is still required.

Applications

The relatively coarse resolution precludes the technique from being used to measure anything but gross differences in community composition between sites and over time. Despite this, the technique may well prove to be particularly suitable for monitoring and managing anthropogenic (and natural) impacts on reefs. Due to the normally very high variability in benthic cover on reefs and the dynamic nature of communities, it has traditionally been extremely difficult to differentiate between anthropogenic impacts and natural change. Therefore it is usually only gross changes as a result of developments which will attract the attention of reef managers. In prac-

tice, the coarse resolution may not prove all that limiting, because for almost all impact studies undertaken in the GBR Marine Park, where data was collected by in-situ observation, the data has always had to be lumped to a very low level of resolution to be analysed.

Another difficulty of monitoring impacts is frequently that the precise nature of impacts cannot be predicted in advance. For example, it is difficult to anticipate if body wastes from 900 people/day swimming on a pontoon site, together with fish feeding activities and bird droppings will elevate nutrients to the point of changing the benthic communities. A lot of sampling effort could go into looking for changes in the abundance of the wrong organisms. The real benefit of photography, and video photography in particular, is that the researcher can re-sample the baseline video tapes at a later date for unexpected changes which may have taken place.

A permanent record (at least in the medium term) of the substrate also allows managers to have some flexibility in the way they manage certain types of potential impacts. They can save the expense of analysing and reporting on data if "nothing obvious" has changed over time, but have the option of quantifying any impacts if they become evident later. Analysis is usually quick (12 minutes per 50m transect, Kettle, pers. com.) and the expense of data collection is nominal with managers able to take the video footage themselves. GBRMPA is currently trialling the use of video photography to monitor impacts from a pontoon operation. In conjunction with Queensland Department of Environment & Heritage, trials are also underway for long term monitoring of other heavily used tourists destinations.

There is currently a major push to monitor the long term health of the GBR and video photography may be used along with with other techniques in the sampling program. Apart from obtaining a permanent visual record of reefs, video photography also lends itself well to sampling large areas of reefs, thereby providing a better opportunity to sample in a representative manner.

Video photography is still very much in the developmental stage and has by no means been accepted as a universally robust monitoring tool. However, important inroads have been made and with further development and verification of results, it is sure to find a niche in the tool box of sampling methodologies.

References:

Kettle, B.T.K. (in prep). Baseline study of Moore Reef - Sunlover Cruises Pty Ltd. *Report to the Great Barrier Reef Marine Park Authority.*

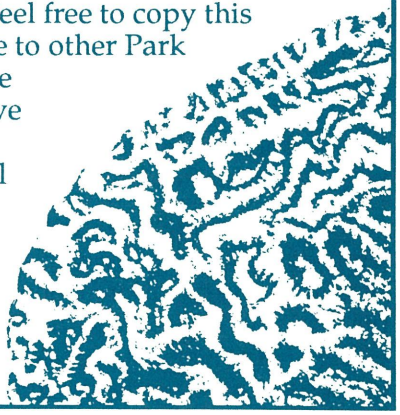
Kettle, B.T.K. (in prep). Second baseline study and monitoring of Moore Reef - Sunlover Cruises Pty Ltd. *Report to the Great*

CORAL BLEACHING ALERT

Dr Jamie Oliver

In the last few weeks the Authority staff have observed substantial bleaching of coral on Magnetic Island, and have received reports of bleaching at Low Isles. It is not yet known how extensive, or severe this bleaching event is, however in some other years (particularly 1982) bleaching has occurred over most of the Great Barrier Reef, and resulted in the mortality of large numbers of corals. Bleaching has also been recorded on reefs in other parts of the world. Some scientists have expressed grave concern over the extent and severity of global coral bleaching which has occurred in recent years. Since bleaching can occur as a result of elevated water temperatures, they have suggested that this phenomenon is a response global greenhouse-warming and that it is a first indication of the effects which global warming may have on the ecosystems of the world.

Although most scientists feel that it is premature to draw conclusions regarding the relationship between global climate change and bleaching events in different parts of the world, it is essential that we document all bleaching events as thoroughly as possible. Accordingly the Great Barrier Reef Marine Park Authority is calling on all reef-users to report any observations of coral bleaching and to record as many details as possible on the location, depth, percentage of corals and types of coral affected. Special reply-paid forms have been prepared by the Authority for this purpose and one is included with the Newsletter (at least for Australian recipients). Feel free to copy this and distribute to other Park users. A more comprehensive article on bleaching will be found in the next issue of Reef Research.



DIVING THE TORRES STRAIT

A TRIP WITH A DIFFERENCE

Udo Engelhardt

Someone once told me that diving on a tropical coral reef means to enjoy the clear, warm and sheltered waters while being submerged in a different world.

Well, different it was, the trip to the reefs of the Torres Strait. Unfortunately, we didn't seem to be able to find those crystal-clear, calm waters that we were all dreaming about and collecting the biota samples for heavy metal analysis as part of the pilot program for the Torres Strait Baseline Study apparently wasn't meant to be easy!

Our trip on M.V. "Sunbird" late last October was an 'eye-opener'. Those twelve days of diving and cruising the Torres Strait took us from the northern end of the Warrior Reefs off the coast of Papua New Guinea to the Bourke Group of islands in the eastern part of the Strait.

We were never short of excitement when anchored in a small *'secluded'* inlet near one of the Warrior Reefs. Having a couple of New Guinean fisher boats (carrying 30 - 40 people each!) within 50 metres of "Sunbird" doesn't exactly make you feel comfortable since only days before riots on nearby Daru had destabilised the political situation. Terry, our skipper, appeared to grow more grey hair every day and his concerns seemed warranted when one of those boats (that was sitting within 30 metres of "Sunbird") dragged anchor one night and ended up on the reef.

The Warrior Reefs, due to their close proximity to the coast of Papua New Guinea and in particular the Fly River, are characterised by muddy waters with near zero visibility and strong currents ripping through the deep channels between reefs. Naturally, such conditions didn't help things, but we managed to get what we came for (well, nearly everything!). Our *'menu'* of samples included several species of seagrass, the burrowing clam *Tridacna crocea*, the black-lip oyster, the sea-cucumber *Stichopus chloronotus*, and the reef snapper *Lutjanus carponatatus* commonly known as 'stripey'. Generally, stripeys were pretty difficult to get hold of at some of our sites, but we finally managed to obtain a complete sample near one of the coral cays that make up the Bourke Group of Islands.

Located to the south-east of the mouth of the Fly River, the reefs in the eastern part of the Torres Strait are entirely different to those of the Warrior Group. Whereas the Warrior Reefs are often dominated by macroalgae and fast -growing branching corals, the Eastern Reefs are characterised by a more diverse mix of corals including large 'fields' of *Porites* bommies. The water tends to be a lot clearer and a typical reef-scape reminds one of the mid-shelf reefs of the central Great Barrier Reef. As a result, collecting the biota samples was quite a bit easier and less time consuming. So we managed to spend some hours exploring the islands giving us a welcome break from the *'hardships'* of life on board a research vessel.

All good things come to an end, and so did our trip into a different world. Anyone who might get the opportunity to go to this amazing part of the world should do so and enjoy the diving with a difference.

A STRATEGIC PLAN FOR THE GREAT BARRIER REEF WORLD HERITAGE AREA

A long term strategic plan is being developed by the people of Australia for the Great Barrier Reef World Heritage Area. The plan will establish the direction for the area's use and protection into the 21st century.

The Great Barrier Reef World Heritage Area is a special place. Inscribed as a World Heritage Site under the prestigious UNESCO convention to protect the world's outstanding cultural and natural heritage areas, the reef and islands are seen as one of the great natural wonders of the world. The Reef is also protected by the world's largest marine park.

To conserve the area's rich natural resources, while adhering to the principles of economic sustainable use, a vision of how Australians want the world heritage area to look in 25 years is being created. Management agencies, conservation groups, scientists, recreational and commercial user groups, Aboriginal and Islander communities and local residents are working to create this vision. Together they are developing a 25 year strategic plan for the area's future. As well, a 5 year plan is being developed which will provide direction with the corporate planning of management agencies and interest groups.

Public support for this plan is essential for its success. Consultation between government, private and voluntary agencies is paramount, as is public participation into the development of the plan itself.

If you would like to be kept informed regarding the development of the plan, please write to the Planning and Management Section of the Authority with your name, organisation & address outlining your particular area of interest in the Great Barrier Reef World Heritage Area.