

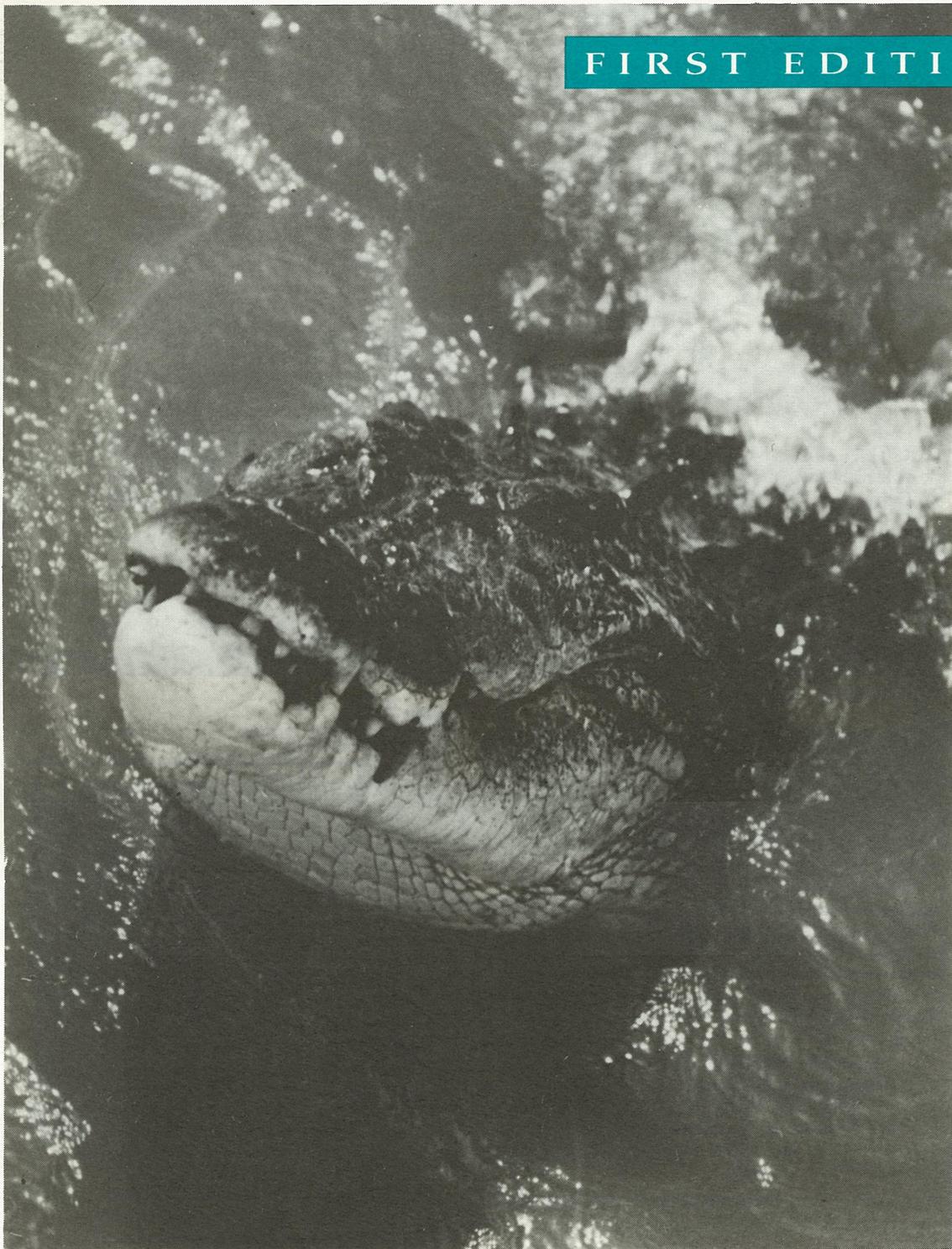
Volume 1 No 1 September 1991

Coralines

MAGAZINE OF
THE GREAT BARRIER REEF AQUARIUM



FIRST EDITION



Articles on • • • CROCODILES • WHALES • TURTLES • CORALS •
• • • SPECIAL LIFTOUT AQUARIUM ACTIVITIES GUIDE • • •

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Coralines

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Great Barrier Reef Marine Park Authority

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E DITORIAL

This issue of Coralines heralds the start of a new era for the Aquarium. As the Director, Ian Burston, explains in his introduction, 'we are more than just an aquarium'. We hope that this edition of the magazine will illustrate that.

In this issue we bring you a variety of articles. Jeff Miller and Margaret Card from the Queensland National Parks and Wildlife Service have written a wonderfully informative article on marine turtles on the Great Barrier Reef. With the recent hatching of turtle eggs at the Aquarium, the public has shown great interest in these creatures and there have been many questions asked by visitors.

Humpback whales are a constant source of fascination and whale watching has now become a lucrative industry. Mark Simmons writes why this is so and on the possible impact.

Corals have been found to provide researchers with accurate weather records. Dr. Peter Isdale from the Australian Institute of Marine Science expands on this theory.

In each issue we will endeavour to bring you stories on different topics. As well, we will have regular contributions from the Aquarium on various activities, the education and volunteer programs, exhibits and promotions. The children have not been forgotten and there is a page for them with puzzles and stories. We hope you enjoy this first edition and look forward to hearing your comments.

Alison Ferry
Editor

C ONTENTS



Front Cover :

This unique photo was captured by Mark Simmons at the Crocodile Farm, Darwin, Northern Territory.

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Message from the Aquarium Director

Welcome to the new look magazine of the Great Barrier Reef Aquarium. This is just one of many exciting changes that are happening in line with our plans for the future. Even our name might be changing! Why? Read on!

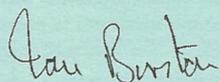
We have discovered that we are a lot more than just an aquarium. We are a link between people and the marine environment. We are playing a major role in saving the Great Barrier Reef for future generations to experience and enjoy. We are a learning experience where people can enrich their knowledge of and commitment to the environment.

The names 'Aquarium' and 'Wonderland' come from outdated values about 'fun parks' and other mass tourist attractions. We are much more than a tourist attraction and our name(s) and our public image need to reflect our true mission.

We have also discovered that there is a huge network of people out there that love this facility and want to keep in touch with it and support the protection of the Reef, even though they may not be able to visit Townsville. These range from ex-members and volunteers, to politicians, academics, businessmen, schools, senior citizens, divers and environmentalists.

We intend to follow up these people, keep in touch with them about what is happening and give them every opportunity to maintain an involvement with us, albeit from a distance. If you are one of these people, and we haven't contacted you yet, please drop us a line.

This magazine will be a major component of our information program, I hope you like its style and enjoy its content.



Ian Burston
Director

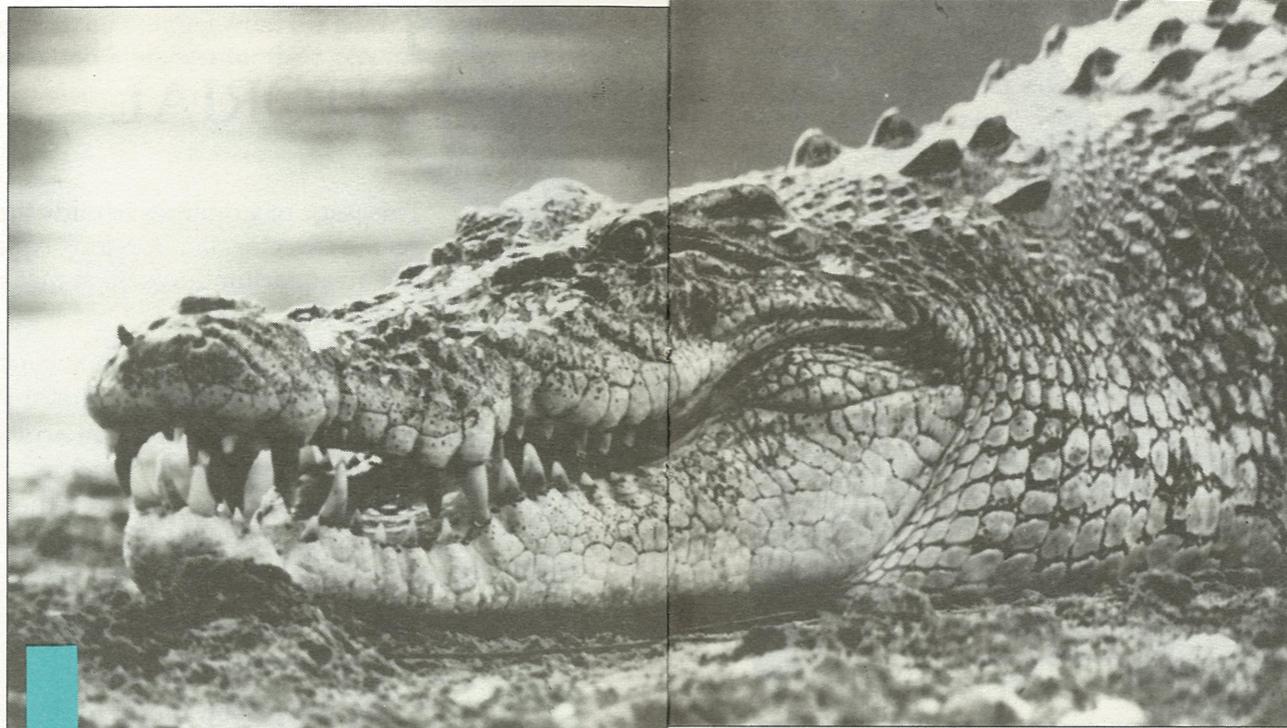


Photo Mark Simmons

The Great Barrier Reef Aquarium has opened an exciting new crocodile display, coinciding with the release of the movie **Crocodile Man**. Exhibits Officer, Andi Cairns, with the help of volunteers has produced a dramatic display that incorporates vivid colours and information. Although crocodiles are portrayed as dangerous predators worthy of respect, the exhibit emphasizes their long ancestry and highly specialized adaptations that have made this a very successful species.

The Touch Tank was given face-lift. Aquarist, Geoff Shannon, with guidance from John Hoey, Curatorial Manager spent many hours transforming the Touch Tank into a lagoon environment. The results are breath-taking with a variety of water weeds, water lilies and a grass landing. The tank redesign is accommodation for a temporary visitor, a 2 metre salt water crocodile on loan from the Billabong Sanctuary.

To ensure visitor and crocodile safety, Smorgan ARC have donated fencing materials for the duration of the display. Fencing Contractor Dennis Lapico and Ralph Harrebomee spent a number of nights setting up the fence to make sure that the crocodile was safely out of visitor reach.

Aquarium meets crocodiles Eye to Eye

Anna Harrebomee

A new Touch Pool has been established so visitors can still get a feel for a variety of reef animals.

Guides and volunteers rose to the challenge of the new exhibit. They have developed a number of talks describing the amazing world of these highly developed reptiles, explaining how these animals have managed to survive so long and emphasizing the need to respect crocodiles rather than consider them as blood thirsty killers.

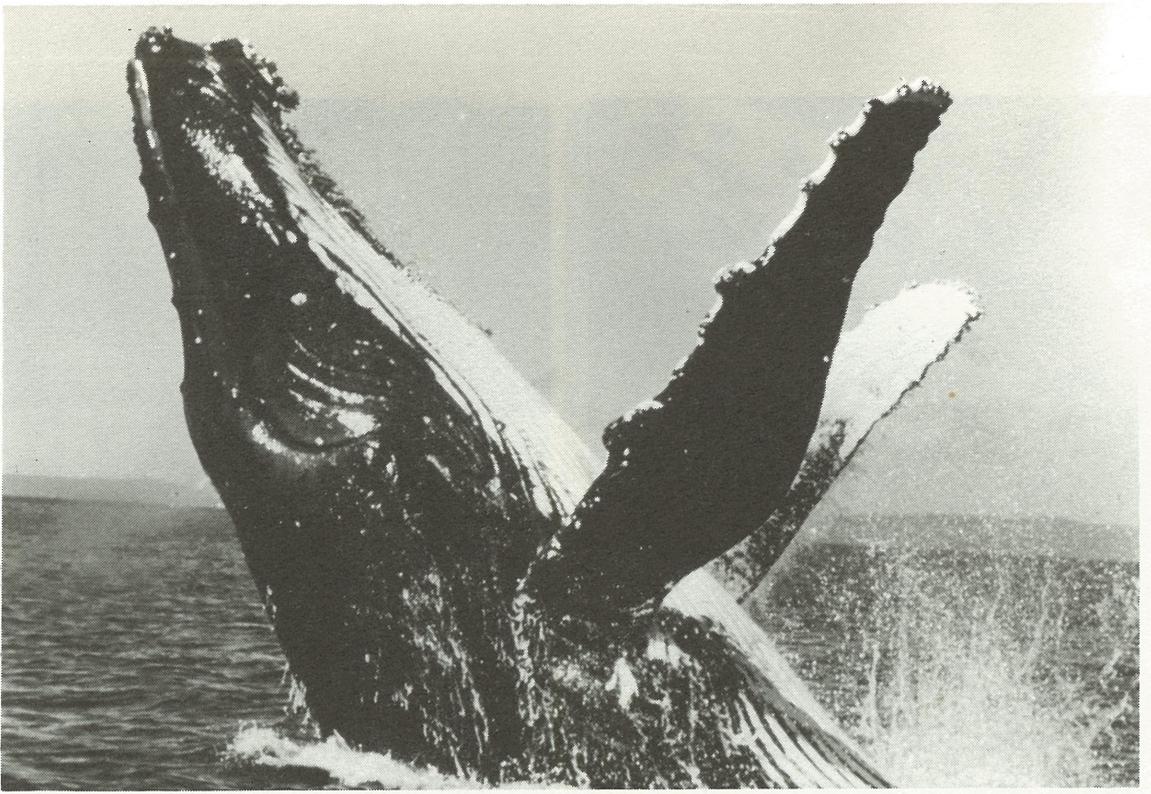
The Crocodile display opened in conjunction with the world premiere of **Crocodile Man**. A docu-drama produced by world renowned underwater film maker David Ireland. The film, currently being shown in



Crocodile in new Aquarium lagoon exhibit Photo Nadine Fisher

the Aquarium theatre, took 4 years to produce. David Ireland spent many hours in crocodile infested waters to give us some spectacular footage of the crocodile in its own environment. Unlike many films seen today, no trick photography is used, everything is true to life. **Crocodile Man** is the first film to feature footage of crocodiles taken in the water with the animals. At times David Ireland donned scuba gear to film crocodiles feeding just centimetres away from the camera. A specially designed cage allowed him to film in places with dubious names like the 'Blood Drain' an area renowned for large crocodile populations. David spent days inside the cage in searing heat waiting for a chance to film these camera shy animals. The hunt for crocodiles led David to aboriginal tribal elders who taught him legends and how to summon crocodile with the call of a hatchling in distress. David Ireland is able to arouse or soothe a crocodile's anger. The result is a unique feature film that combines the beauty of the Australian landscape with a new insight into this incredibly intelligent animal.

For more information on screening times and admission prices refer to the Activities Guide on page 9 or phone 818710



A WHALE OF A STORY

Story and pictures Mark Simmons

Thirty years ago we came very close to wiping out the entire population of humpback whales from the east coast of Australia. The population estimate in 1962 was a paltry 200 individuals, and this is what remained from a pre-whaling estimate of 10,000 whales. However, the good news is the humpbacks are making a slow but methodical comeback, to the point today where a lucrative whale watching industry has developed in places such as Hervey Bay.

This now means if people want to watch whales and take some photographs, they can - an experience that 5 years ago was only in the domain of a handful of whale researchers or a fortunate few of the general public who had a chance encounter. This year 21 vessels will service the Hervey Bay whale watching industry, starting in mid August and finishing some time in October when the numbers of whales left in the bay can no longer guarantee the chance of sightings.

It is not surprising that tens of thousands of people are drawn to these creatures every season. When you can see a 40 tonne animal lift itself out of the water and come smashing

down on its back, or a pod of whales literally surround a boat with puppy - like trust and curiosity, then people will naturally get an enormous adrenaline rush from these experiences and want to keep coming back.

However as a slight dampener on this situation some editorial comment is beginning to appear in the media about the detrimental impacts of the whale watching industry. How could this be? To answer this, it is worth having an understanding of why these animals are here and the processes they use to maintain and increase their current population.

Firstly it is easier to explain what they are not doing i.e. they are certainly not putting on a show for a group of awe - inspired tourists. When a humpback breaches it is not being induced to perform by the clapping, singing or cheering. These are totally wild, untamed animals that are displaying a range of behaviours, quite spectacular in many instances, for very specific purposes. When we start to humanise these behaviours then we run the danger of turning the industry into a kind of freak show and lose sight of the overall objec-

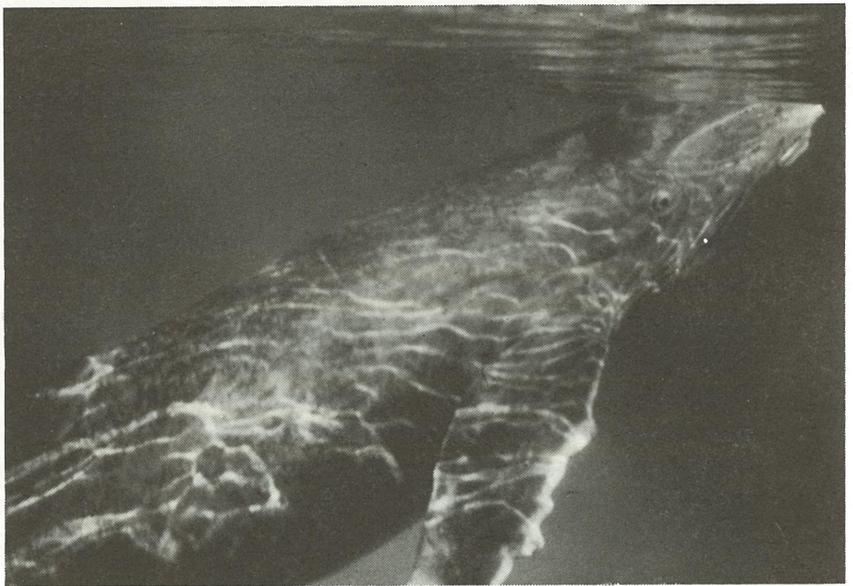
tive. The objective is to allow these animals to engage in their normal behaviours, which largely have to do with finding and mating with a suitable partner. The objective is not to get as close as possible so 'I can get a great photo for the bedroom wall.' Their feeding grounds and their calving/grounds are separated by about 6,000kms. This dictates that the humpbacks undertake these lengthy annual migrations which have become almost as regular as clockwork. In 1986 one animal was recorded as passing by Stradbroke island, offshore from Brisbane, within 30 minutes of the time it passed the same location the previous year. They arrive on the Great Barrier Reef and disperse far and wide, in some instances almost to New Guinea. But the Whitsundays looks like the area where most calving is taking place. Calves are recorded here earlier in the season than anywhere else on the Reef.

The whales begin to arrive in Hervey Bay in mid - August. This may not be the calving ground but it may be the area where the whales congregate on the southern migration and where mating takes place. The behaviours that are observed here are different than anywhere else on the Reef. There is a lot of touching, nudging and feeling going on with those 3 metre pectoral fins. Fighting between males is also commonly seen which can be a spectacular display of raw energy as they ram into each other or use their tail flukes to deliver massive karate chops.

The gestation period is almost 12 months.. So when you think about it their breeding and feeding strategies are neatly aligned. An impregnated female will leave Hervey Bay and travel to the Antarctic feeding grounds for the summer. There she will feed voraciously in preparation for next years migration, increasing the thick layer of blubber surrounding her body. She will start her northerly migration about March the following year and arrive back in the protected and warm waters of the Great Barrier Reef for winter. It is here the calf will be born.

Breaching, singing, tails smashing the water are all the behaviours that people want to see and hear during their whale expeditions because they are explosive, dynamic and exciting. But these ,in many instances, are the whales communicating with each other. These are free roaming animals in a large ocean space and lifting oneself into the air and slamming into the water may be a very good way of attracting attention or displaying strength and virility. 'I've got a big breach, so let's get together', so to speak.

Mating between humpbacks has never been positively photographed or recorded. When you think about this aspect of their overall breeding strategy, then a place like Hervey



Bay is an obvious choice. It is quiet, sheltered and protected - exactly the kind of area many animals, would choose for such an activity.

Over the top of this we now have whale watch boats, research vessels and any number of recreational craft creating noise and commotion. The impacts of all this extra activity have yet to be identified and certainly in other parts of the world regulated whale watching activities have been in place for many years.

If you get the opportunity to see these animals in full acrobatic display then, firstly, enjoy the experience for what is being offered to you. But take a moment to consider, that what you are looking at is basic whale society in action. They are making friends, looking out for enemies, communicating and above all, ensuring a future for their species. We are just observers.

ON TRACK WITH THE ENVIRONMENT!

Andi Cairns

The Green Train was Queensland's first environmental train. An initiative of the ABC, the Green Train was a showcase for environmental and conservation groups, government agencies and commercial enterprise under the theme 'Finding Common Ground'. It was an opportunity for all parties to show the public what they are doing for our world in an age of increasing environmental awareness and concern. Travelling down the coast in June this year, the train stopped at major railway stations between Cairns and Brisbane.

The Great Barrier Reef Marine Park Authority and Queensland National Parks and Wildlife Service, jointly under the 'Marine Parks' banner, presented a carriage with a difference! Visitors experienced an underwater world of fibre and fabric.

There were no 'Don't touch' signs. In fact, there were no signs at all! It was a chance to feel the textures of the materials and enjoy the kaleidoscope of colour without restriction. Designed with kids in mind



everything was touchable and invited small visitors to play. It was a fantasy reef with soft satin starfish and sea cucumbers living amongst quilted corals, vibrant silk reef fish swimming in the air and a cuddly dugong to sit on!

The message was simple: *The Great Barrier Reef is a magical place!*

The concept worked well. Kids came back for a second and third look, bringing their parents and demanding of them answers to their questions about the reef and its inhabitants. Aquarium and GBRMPA staff and volunteers were on hand to fill in the gaps and to give further information on the Marine Park.

We were delighted with the success of our soft sculpture reef. A similar exhibit is now being planned for the Aquarium.

EDUCATION AT THE AQUARIUM - *in and out of the public eye !!*

Loretta Saunders

Learning about animals, adaptations and ecosystems takes on a whole new perspective when you come eye to feeler with some of the Reef's most fascinating creatures. A school session at the Aquarium is a great way to apply concepts learnt at school to real life in an environment buzzing with the excitement of making new discoveries.

The Great Barrier Reef Aquarium's School Program offers teachers and students many different ways to explore the Great Barrier Reef. The Program complements the secondary science, geography and tourism studies curricula and the primary science, language and art curricula yet teachers from other subject areas have made use of this exciting teaching resource. Added to this are some new programs - the *Triggerfish Trail* for Preschool to Year Three students and a Multi-strand Science program for Years Eleven and Twelve.



WHAT'S HAPPENING AT THE



GREAT BARRIER REEF AQUARIUM TOWNSVILLE • AUSTRALIA



ACTIVITIES GUIDE SEPTEMBER 1991 - FEBRUARY 1992

DAILY EVENTS

Crocodile Man

For more information on screening times
phone 818710

Cost: Daytime Sessions

Members	\$2.50 adult \$2.00 pensioner/child (age 4-14 years)
Non-members	\$12.50 adult \$10.00 pensioner \$ 7.00 child (age 4- 14 years)

(Non-members, includes Aquarium admission)

Night sessions (Movie only)

\$6.00 adult
\$5.00 pensioner
\$3.00 child (age 4-14 years)

Guided Tours 11.30 am and 2.30 pm

WEEKLY EVENTS

Shark Talks* Tuesday 3.20pm

Shark Feeding* Tuesday 3.30pm

Children's Craft Activities

Sunday 11.00 am-12.00 noon

* The Aquarium reserves the right to cancel or change
program times. To confirm times please phone Aquarium
Front Desk 818891

OTHER ACTIVITIES

Early December Renovation of Aquarium
front entrance and shop completed.

TEACHERS !

Teachers Aquarium Open House Tuesday, 25th Feb. 1992.

Mark this in your 1992 diary NOW !
There are so many changes going on -
new displays and programs, so
come and reacquaint yourself with the
Living Classroom Experience.
For more details, call our Aquarium
Education Officer on 818890.

Saturday 1 March 1992

Applications open for the next volunteer
Training Course. Inquire at Aquarium Front
Desk.

CHILDREN'S ACTIVITIES

Crocodile Crazies

16 -20 September Daily 1.00 - 2.00 pm
23 -27 September Daily 1.00 - 2.00 pm

SPECIAL ACTIVITIES

Night Stalkers

An Aquarium sleepout just for Kids!

Kids! Have you ever wanted to sleep with the sharks or curl up with a coral? Then join us and all your favourite fishy friends for a night of art, craft and games. Watch the day creatures go to sleep as the night stalkers reveal themselves. Bring your own sleeping bag and torch. Light supper and breakfast provided. **NO PARENTS ALLOWED!**

Ages:	6 - 12 years		
Date:	Friday, 21 February		
Time:	7.00 pm-8.00 am		
Cost:	Members	1st child	\$22.00
		2nd child	\$18.00
		3rd child	\$16.00
	Non-Members	1st child	\$27.00
		2nd child	\$23.00
		3rd child	\$21.00

Bookings Close: Friday, 14 February
Minimum: 20 **Maximum:** 30

Aquarium After Dark - A special event

Ever wanted to see how fish and corals are collected? Or how the leopard shark is examined? A movie, recently completed for release on the world market shows this and more of the real life dramas and routines that occur at the Aquarium. Here is your chance to see a rare preview of this 45 minute movie on the Aquarium. Coinciding with this event members will be able to discover the unique nocturnal behaviour of some of their favourite Aquarium residents. Divers in the tank and our staff will fill you in on all the late night Aquarium action.

All children must be accompanied by an adult.

A) Gala Evening with Champagne Supper

Date:	Tuesday, 29 October	
Time:	8.00 - 10.30 pm	
Cost:	Members	\$25.00
	Non-members	\$35.00

Minimum: 20 **Maximum:** 30

Bookings Close: Tuesday, 22 October

B) Family Evening with Light Supper

Dates:	Tuesday, 26 November	
	Wednesday, 27 November	
Time:	8.00 - 10.30 pm	
Cost:	Members	\$15.00 adult, \$ 9.00 child
	Non-members	\$25.00 adult, \$19.00 child

Minimum: 20 **Maximum:** 100

Bookings Close: Tuesday, 19 November

Aquarium Christmas Party

Join us for an evening of fun and laughter when Santa Claus makes his regular visit to the Aquarium. See Santa in his board shorts give presents to the children. Kids! Come as your favourite reef animal and enjoy corals and carols by torchlight. Light refreshments will be served. All children must be accompanied by an adult.

An evening not to be missed.

Date:	Friday, 13 December	
Time:	6.30-9.00 pm	
Cost:	Members	\$ 9.00 adult, \$ 6.50 child
	Non-members	\$15.00 adult, \$10.00 child

Bookings Close: Friday, 6 December
(Presents for children under 12 years.)

AQUARIUM COURSES

Reef under Glass

Learn to create your own slice of the reef. Uncover the tricks of the trade when Aquarium experts show how to build and set up your own salt water aquarium.

Advanced Marine Biology

(Pre-requisite Marine Biology Course for Beginners)

Learn how to age your own fish. Find out the inside story on fish biology. Develop your own research program on the reef, studying your choice of animal.

Dates to be advised, phone Aquarium Office for more details.

FORTHCOMING EVENTS

Wednesday 4 March 1992

Open House for prospective volunteers. Applications close for Volunteer Course.

Wednesday 11 March 1992

Volunteer Course Commences

Watch out for the next edition of *Coralines*, available in March.

Book and pay early to avoid disappointment! Use the Booking Form Provided when you book at the Aquarium Membership Office or Shop.

For further information, details of Aquarium activities, or additional Booking Forms, please contact:

Membership Office
G.B.R. Aquarium
P.O. Box 1379
Townsville 4810
Phone 81 8886

MEMBERS NEWS

Gastronomical Delight

Each year members are treated to a taste from the depths of 'Neptune's Kitchen'. This year was no different. Members sampled squid, scallops, bugs, lobster and shark. Denis Hart from the Queensland Commercial Fishing Organisation ensured that only the best quality seafood was supplied. BJ's Fruit Barn donated the fruit, vegetables and fresh herbs needed to create the exotic dishes. A variety of red and white wines donated by Seppelt Wines provided a perfect complement to the food. Members were shown how to prepare seafood. Some members were even coaxed into assisting with the cooking demonstrations. These demonstrations required members to don unusual attire and drink some interesting brews. Aquarium volunteers are congratulated for their efforts. They slaved over hot stoves and chopping boards to ensure the evening's success. The evening was enjoyed by all with the last members leaving in the early hours of the morning.

Under Eights Week 13 - 17 May 1991

This year's Under Eights Week saw Aquarium volunteers Rosemary Burdeau, Anita Greening and Margaret Pickersgill represent the Aquarium in Bare Foot in the Park for children. Children were tempted to place their hands into the dark feely boxes to discover their secrets. The under eights played with our Ocka the Octopus and looked at turtle eggs and shells. The children all received a special stamp of a seahorse as a reminder of the day's events.

EXHIBITS

WHAT'S NEW?

Andi Cairns

1991 is an exciting year in the Aquarium!

You may already have heard some of the hot gossip about changes (- additions or subtractions) to the exhibits. I thought you would all like a bit more information at this stage on the proposals. Here's the up-to-the-minute low-down on Aquarium exhibit plans, things really are buzzing backstage!

World Heritage area:

New light boxes have been installed and the area has been smartened up. In the longer term, plans are afoot to make a more interactive exhibit here - perhaps with a globe and 3D images of World Heritage sites.

Commercial Fishing Display:

This area is in urgent need of attention! I'm pleased to report that the Queensland Fish Management Authority (who mounted the display originally) have agreed to short term repairs by October this year. They are also planning a bigger and more exciting exhibit in the long term.

...Cont. over

BOOKING FORM *(Complete both sides of booking form)*

Part A

NAME:.....

ADDRESS:.....

.....POSTCODE:.....

PHONE - WORK.....HOME.....M/SHIP NO.....EXP. DATE.....

Part B PAYMENT

I enclose cheque/money order payable to

G.B.R. Aquarium for \$.....

Credit Card B/card, M/card, Visa.

Card No.....

Exp date.....

Card Holders Name.....

.....Signature

Please send me information on:

Volunteers Sponsorship

Educational programs

Membership

Mail to : MEMBERSHIP OFFICE,
P O BOX 1379, TOWNSVILLE. 4810.
Enquiries (077) 818886 between 10 - 3pm.



EXHIBITS

WHAT'S NEW?

Front Entrance and Shop:

Changes here have been under development for some time. Construction is planned to start in October this year and by Christmas there will be a wonderful new entrance, highlighting the magnificent glass and fabric sculpture by Robyn Gorden. The shop is to be extended to make way for lots of new 'reefy' Christmas presents for you to buy!

Area 'A' - Ancillary tanks opposite Reef Window position '4' on the Aquarium Guide

This area has a bright future. We want to be able to change exhibits here easily and often to help make the Aquarium a dynamic and exciting place to visit again and again. Light boxes and existing text fields have been removed and a coloured stripe painted on the wall. Signage has been made more 'reader-friendly' and detachable to facilitate frequently changing exhibits.

Soft-sculpture Reef:

Still in the early planning stage. The success

of the 'Green Train' exhibit convinced us that a durable soft-sculpture reef would be an asset, particularly for the younger visitors. The Green Train carriage arrived back in Townsville for dismantling in July. We assessed what could be used in the Aquarium and started developing our own 'Play Reef'. Come and play in December!

Reef Geomorphology exhibit:

We'll probably find another name! This area, to the right hand side of the first corridor, has been targeted as a priority. The importance of exciting visitors as soon as they enter a facility such as ours and thereby raising their levels of interest for the centre as a whole has been recognised. We are now some way down the track in planning a new exhibit here in collaboration with the Australian Institute of Marine Science. Anticipated completion by January 1992.

Predator exhibit:

At the 'Research and Development' stage but definitely a 'goer'. Discussions on landscaping the Predator tank and developing interpretive material are beginning. For completion by the middle of next year.

A busy time ahead!



Part C

Given Name	Age	Activity	Date	Cost

Bookings made by phone are payable within seven days to confirm booking. Credit card payments are accepted for activities costing over \$10. No refunds are given for cancellations made less than 7 days before activities begin. Cancellations made prior to 7 days are subject to a \$2 charge.

The Aquarium reserves the right to cancel programs if minimum numbers are not reached within 7 days of activity commencement -in such cases payment will be refunded. Certain activities, including those involving diving and snorkelling, are not covered by the Authority's insurance policies. Accordingly, all people taking risk are required to indemnify the Authority against claims for loss or damage.

OFFICE USE ONLY:

Amount paid:.....Date Booked:..... Payment method:..... Receipt No:.....

TURTLES ON THE GREAT BARRIER REEF

Dr Jeff Miller and Margaret Card

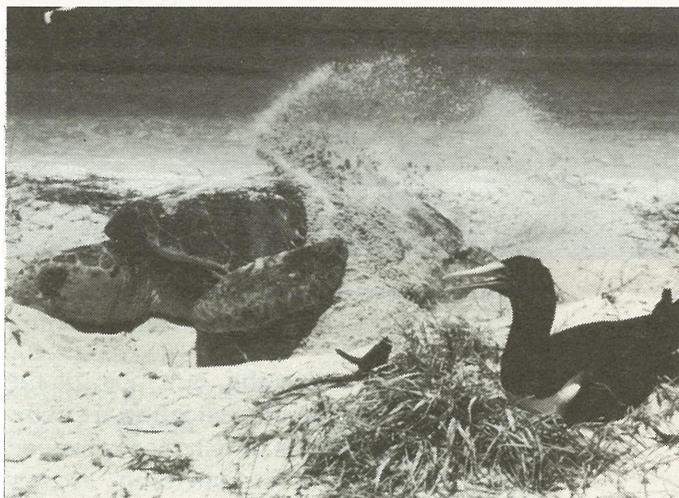
Encounters with sea turtles

Although most people encounter marine turtles that have crawled up a beach to lay eggs, the majority of a turtle's life is spent in the water not on the land. The life cycle of all species of marine turtles follows a general pattern.

Typically a female turtle emerges from the ocean at night to lay her eggs. The turtle usually crawls above the high tide level and into the vegetated area of the beach. No one can say for sure how a turtle actually selects the spot in which she digs the nest but the actual nesting behaviours are well known. First the surface sand is swept away using the front flippers to form a body pit; then the hind flippers are used to dig a flask-shaped chamber for the eggs. Once the egg chamber has been completed the eggs are laid, dropping into the hole in ones, twos, and threes. The egg shell is pliable and does not break, even though the drop may be 25 cm or more. Once all the eggs have been laid, the turtle uses its hind flippers to cover them and to pack the sand down; then by crawling forward and throwing sand backwards with her front flippers she camouflages the nest site and protects the eggs from environmental extremes. When the nest site is fully covered, the female turtle crawls back to the sea where she will wait about two weeks before repeating the whole process, usually on the same beach.

Sun, sand and sex

Each female does not lay eggs each year. There is usually an interval of several years before she has again stored enough food energy to become ready for reproduction and to make the long journey to the nesting beach. The actual interval between nesting seasons is different for each species but the average interval varies from about three years to six or more years. During a nesting season a turtle will lay 3 to 7 clutches of eggs and, depending on the cycle of the individual female, at inter-



*Loggerhead turtle nesting beside a brown booby in the Swain Reefs. Turtles occasionally nest in the daylight.
Photo by M. Jones.*

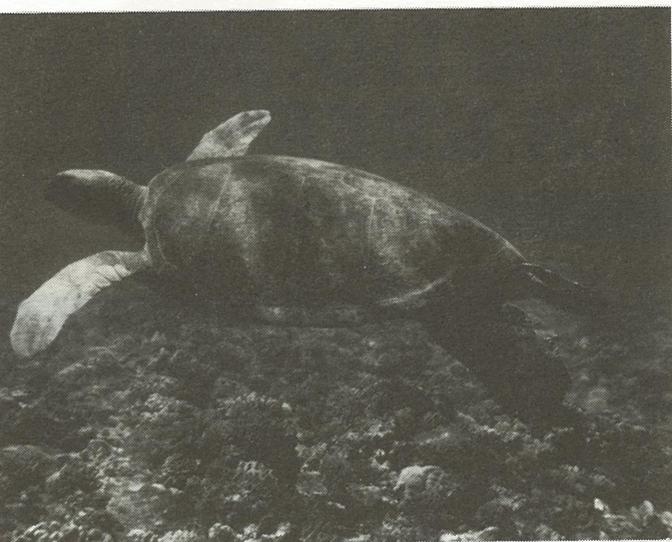
vals of approximately two weeks.

The eggs of marine turtles are white, soft shelled and round and range in diameter from the ping pong ball-sized eggs (2.5 cm) of the Hawksbill turtle to the billiard ball-sized eggs (5 cm) of the Leatherback turtle. Inside, all the eggs contain a yolk and albumen (white), similar to those of a hen's egg.

The eggs require 7 to 12 weeks to hatch depending on the temperature of the sand where they are developing. Cooler temperatures not only extend the period of incubation but also fix the sex of the hatchling as male; females are produced by warmer temperatures. This process, which is known as Temperature Dependant Sex Determination, is found in all sea turtles but is not universal in all types of fresh water tortoises.

The lost years

When fully developed, the hatchling turtles dig their way as a group to the top of the nest just under the beach surface; when the beach surface temperature drops in the early evening they emerge en mass to crawl towards the water. In the few minutes that crossing the beach requires, some of the hatchlings may be



Green turtle swimming over coral. Photo by J. Miller.

eaten by birds and crabs, but most of the predation occurs after the hatchling are in the water. Many varieties of fish (cod, grouper, sharks, etc.) feed on the hatchlings as they attempt to swim away from the beach into the safety of deep water.

Those hatchlings that make it into the open ocean presumably follow the drift lines of the major and minor currents. Because very little is known about the life of the little turtles, the period spent in the open ocean is called the 'lost years'.

When the turtles have grown to about 30 cm in length they begin to take up residence in the foraging (feeding) areas used by the adults. These foraging areas are distributed throughout the Great Barrier Reef and the inshore bays, wherever food is abundant. Because growth is slow, more than 30 years (possibly more than 50 years) are required before a marine turtle becomes mature.

Completing the cycle

Once mature, the turtle becomes part of the breeding population and the cycle begins again with the migration of adult female and male turtles to special mating areas. The male turtles return to their home foraging area after mating. The females move to the area offshore from the nesting beach where they will lay several clutches of eggs during the summer months. When their reproductive effort is finished, they too return to their home foraging area.



Flatback turtle emerging from an egg that had been artificially incubated. Photo by J. Miller.

Nesting areas

Although foraging areas are widely distributed, nesting sites are not. For example, loggerhead turtles concentrate their nesting in the southern end of the Great Barrier Reef in three principal locations: the Capricorn-Bunker Group of islands, the mainland coast near Bundaberg and The Swain Reefs islands. Very little Loggerhead nesting occurs elsewhere in eastern Australia.

Green turtles, on the other hand, have two principal nesting areas, one in the Capricorn-Bunker Group in the southern Great Barrier Reef and the other at the opposite end of the Reef at Raine Island and nearby cays.

Turtle species

The Great Barrier Reef is inhabited by six of the seven recognised species of marine turtles. At first glance they may be difficult to tell apart but each species is really quite different from the others.

The largest of the marine turtles is the leatherback (*Dermochelys coriacea*) which may exceed 750 kilograms in weight and be nearly 1.75 metres long (that is, roughly the size of a kitchen table). Its black shell is leathery to the touch and is accented by several white-topped ridges. Leatherback turtles feed principally on jellyfish.

The smallest sea turtle in Australia is the Olive Ridley (*Lepidochelys olivacea*) which at adult size usually weighs about 50 kilograms

and is less than 1 metre long. This turtle is not commonly seen but is known to nest in very low numbers along the Gulf Coast of Queensland.

The two most commonly seen species of marine turtles in Australian waters are the green turtle (*Chelonia mydas*) and the loggerhead turtle (*Caretta caretta*). These two turtles are intermediate in size and weight to the leatherback and olive ridley turtles, the adults being about 150 or more kilograms and about 1 metre in length. They are the species that can be observed at the southern Great Barrier Reef nesting sites and are most commonly seen by people out boating on the reef. Green turtles appear to have a head that is slightly small for their body size whereas loggerhead turtles have large heads. Green turtles feed on seagrass and algae that grows in the in-shore areas and on the reefs. Loggerhead turtles feed on molluscs and crustaceans found in sandy areas.

The flatback turtle (*Natator depressus*), also

one of the intermediate-sized turtles, is uniquely Australian. All the other species of sea turtles breed elsewhere around the world, but the flatback turtle only nests on Australian beaches. Unlike other sea turtles of the *Cheloniidae* which have hard shells, the flatback turtle has a soft shell that feels greasy to the touch. This species lives in the shallow water areas between the reefs and in the Gulf of Carpentaria.

The hawksbill turtle (*Eretmochelys imbricata*) is another small turtle with thick overlapping scales on its shell. It feeds on sponges and other animals and plants that live on the reefs. The long face and tough shell protect the turtle from injury in the reef environment.

Although each species has a unique role in the ecology of the Reef, as a group, marine turtles share many common attributes and many common threats.



Giant corals: Nature's rain gauges

Dr. Peter Isdale

Scientists from the Australian Institute of Marine Science (AIMS) are taking the first steps towards studying the climate of the North Queensland region prior to the arrival of white settlers. Through coral skeletons they have found ways of interpreting the patterns of wet-dry seasons for many centuries past.

Corals grow by adding seasonal layers of calcium carbonate (limestone) to progressively enlarge their skeletons. This carbonate is extracted from the surrounding seawater. In rounded massive-type colonies (like the commonly-understood 'brain' coral, especially those of the genus *Porites*), the seasonal layers of material differ in density between summer and winter. These massive coral domes of *Porites* are the most widespread reef-building corals on the

planet and they contain their own regular and consistent calendar which extends back over centuries in many cases and, in rare examples, perhaps as long as a thousand years. X-ray pictures of slices of these skeletons (or in the case of very large corals, slices of cores drilled vertically from the living surface) allow counting of the annual summer/winter density bands. Scientists can thus work out the age of sections of skeleton.

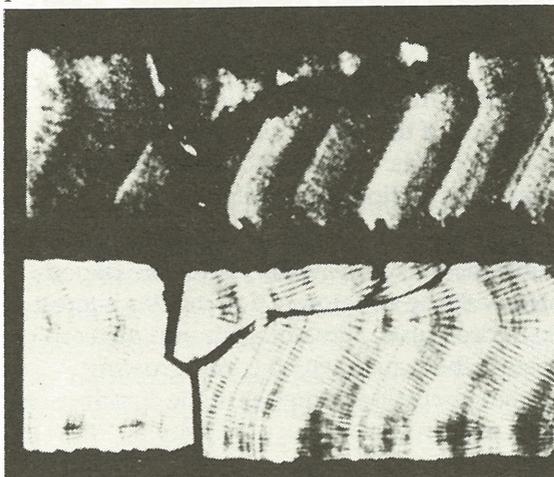
During growth, corals may also extract other substances from seawater. These are deposited with the skeleton. Of particular interest to hydrologists, climatologists and meteorologists is the way in which corals growing within about 20 kilometres of the coastline can trap river-borne organic compounds. Most of these are humic compounds derived from the decayed remains of land plants. These particular compounds fluoresce. Fluorescence

...Cont. over



AIMS scientist coring corals with a drilling rig especially designed and built by the Institute.. Photo courtesy AIMS

occurs when substances give off visible light when exposed with short wave, invisible, ultraviolet light. The substances in the corals fluoresce in the yellow-green part of the spectrum. Irregularly-spaced fluorescing bands are superimposed on the density calendar in the corals. The brightness of the fluorescence is so great that measurements of the skeletal concentration of the humic compounds can be derived by simply measuring



*Comparison of X-ray picture of coral core slice (lower) compared to same slice under Ultraviolet light (upper)
Photo courtesy AIMS*

the fluorescence. Scientists can use these measurements to estimate the concentration of humic compounds which must have been in the surrounding seawater at the time of deposition of the skeleton. This concentration is related to the discharge of adjacent rivers, since it is believed that most tropical coastal catchments contain an almost inexhaustible reservoir of these water-soluble compounds.

Workers in the Coral Coring Project at the AIMS have found a good correlation between skeletal fluorescence, river discharge and rainfall in a coral growing within the influence of the outflow of the Burdekin River in North Queensland. They have used this knowledge to examine the climate of the area each year back to the early 1600's. The level of detailed information about past wet seasons is quite surprising. In the case of some fast growing corals adjacent to very seasonal rivers

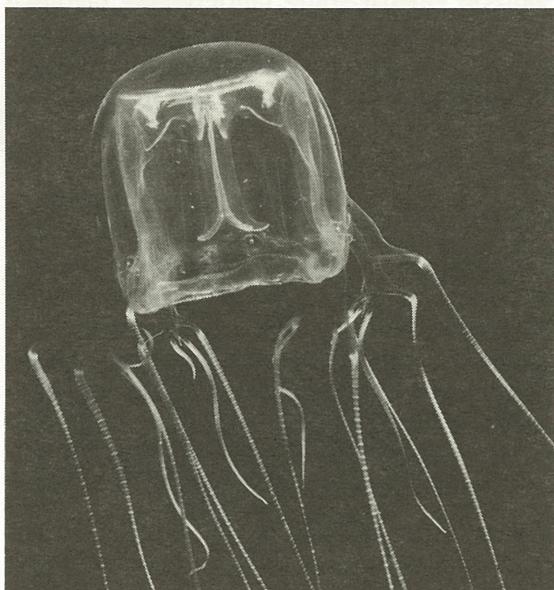
(such as the Daintree River, in far north Queensland), events as close as one month apart can be seen in the fluorescence record.

River discharges are valuable statistics to the meteorologist or climatologist because they can represent climatic 'summaries' of large river catchment areas. While historical records of river activity in Australia (especially in the north) seldom pre-date the early decades of the present century, proxy records of discharge exist for centuries prior to that because of the great age these corals can attain. The highly detailed proxy record of river flow is a novel and valuable resource. It contributes to our knowledge of the natural variability of climatic systems over long periods. In scientific studies into the existence of such phenomena as the Greenhouse Effect, it is this natural variability against which any perceived man-made trends will have to be measured. By providing longer measurements of river discharges for much of the world's tropical regions, work on fluorescent bands in nearshore corals can give us a more extensive geographical and historical knowledge of climate than can all the measurements made with instruments.

CURATORIAL NOTES

Aquarium First

The "Stinger Season" is not yet over at the Great Barrier Reef Aquarium ! After April each year swimming in the sea is safe again as all of the deadly boxjellyfish (*Chironex fleckerii*) have completed their life cycle and died. However a special exhibit tank at the Aquarium has been able to keep a single specimen for a much longer period.



Boxjellyfish (*Chironex fleckerii*) hunting its prey.
Photo Martin Jones

The life cycle of stingers is usually completed in April and May when the adult boxjellyfish spawn - there are separate male and female animals and they probably have some courtship behaviour to coordinate the simultaneous release of sperm and eggs into the water. The fertilized embryos develop into a small polyp stage that attaches to the underside of rocks and other objects in the creeks and estuaries. When spring comes the polyps develop into a free swimming stage and start growing into sexually reproductive adults in the sea.

The jellyfish maintained in the Aquarium was netted in November 1990 off the beach near the Tobruk Pool and had grown to a killer 12 cm in diameter by the following August. Pampered by Warren Haydon and other aquarists the boxjellyfish has been carefully hand fed once or twice a day.

Prawns or pieces of fish are carefully introduced on the end of a long wire to the underside of the bell. The contractile stomach then wraps around the food and passes it to the top of the bell to be digested. Digestion of a large prawn usually takes 2-3 hours. The live natural food of the animal, a small sergestid shrimp, is regularly netted from Townsville harbour and periodically added to the tank.

As far as we know, this is the world's longest living box jellyfish.

Martin Jones

Snakes Alive

In what was probably a first for a public aquarium the Great Barrier Reef Aquarium's Hardwick's sea snakes gave birth to three young in April this year.

The birth, which took place before a fascinated audience of staff, volunteers and visitors, was a rarely witnessed event and has provided insight into an otherwise little known aspect of sea snake biology. As the snakes never voluntarily leave the water, mating and birth take place at sea and are rarely witnessed in the wild.

Although the young snakes survived only a few days the birth has been the culmination of efforts to maintain a long-term sea snake exhibit at the Aquarium. Sea snakes can be difficult to keep in captivity and are not often seen in public aquarium exhibits. The Aquarium's sea snakes, both the Hardwick's and the two olive sea snakes have shared their exhibit tank under the watchful eye of Aquarist, Ian Preece, for nearly three years.

During their first two years together the Hardwick's sea snakes appeared to show no interest in each other. No mating was witnessed until August 1990. As one elated Aquarium staff member exclaimed '...we didn't even know they were holding hands'.

John Hoey

VOLUNTEER NEWS

Alison Ferry

The Volunteer program at the Aquarium has become an integral part of the day to day running of this 'Living Museum'. From the early days of the program when responsibilities were limited and ideas were few, today there is an enormous variety of tasks to be completed and volunteers may choose to work in the area in which they feel most comfortable. As well there is constant education, updates and a calendar of events each month.

In March this year the response to the open night for prospective volunteers was overwhelming. This showed an indication of community acceptance for the program. Our 6th volunteer course commenced in April with some 40 volunteers graduating on May 16th. On this night, several other volunteers were honoured with special pins commemorating either 200 or 500 hours of time given to the Aquarium. This idea, already in practice at Monterey Bay Aquarium in California, has proved to be a popular incentive. The next Open Night for Volunteers will be held on Wednesday, March 4th, 1992.



Aquarium Volunteer Co-ordinator, Susan Hutchinson teaches children in the Quicksilver Discovery Room. Photo Lisa Shugg

Another novel idea was the Volunteer Breakfast held on March 24th in recognition of Volunteers' contribution to the Aquarium. This coincided with National Volunteers Week. The theatre provided the venue and was bedecked with streamers and balloons cascading from the ceiling. The Aquarium staff welcomed everyone and served a beautiful breakfast. Volunteer Chris Augustine commented 'I've had breakfast at good restaurants before, but this

was different. Not only was the food good and the service excellent, but the view from the window was superb. The Emperor Angelfish was performing beautifully, it was a perfect morning and the sun playing on the animal and plant life was a truly incredible sight'.

Those with a creative streak are encouraged at the Aquarium to work with children, help with displays and teach crafts to young people. Workshops in video training, fabric dyeing, Gytaku (fish printing) and other crafts were held and children have also created pottery figures, made an Aquarium Alphabet, worked in glass and made wind chimes.

Fund raising was undertaken to provide a mobile aquarium. This project, based on a small trailer which is able to be towed, will provide a fully equipped aquarium tank, static displays and promotional material. It will be utilized at community events such as school fetes, tourism and leisure expos and cultural activities. An Art Union and a stall in the Cotters Market generated funds and the balance is to be provided by the Sheraton Breakwater Trust following our successful application.

Aware of the fact that there are many in the community who would like to learn about the Reef but do not have time to volunteer, Richard Fitzpatrick, Aquarium Guide set about compiling a Marine Education Course. This commenced on 9th July and was run entirely by volunteers. The course was booked out very early and further courses are planned.

The Aquarium's fourth birthday was celebrated on June 24th and a huge cake was cut and served to visitors on that day. Since then there has been a steady stream of visitors on train and bus tours and along with school tours and various cruise ships, the volunteers have been kept busy with spot talks and guided tours. A spot talk Trophy, donated by Tom Walters, is to be awarded annually and will be another incentive for volunteers. Spot talks have become a popular daily occurrence at the Aquarium and remain in the visitor's mind long after they have left.

As part of a new programme, volunteers will run 'Children's Craft Activities' each Sunday in the Aquarium from 11 am until 12 noon. All children, and their parents, are welcome.

Kids Corner

Hi, A very big welcome to our young Aquarium Members. In this issue we have jokes, join the dots and a puzzle for you to try to solve. We trust that you will enjoy Kids Corner and hope you will write telling us the things you enjoy most. If you would like to write, send in pictures and riddles (about the Sea), or just ask some questions, please address mail to "Rosemary and Lyn", Great Barrier Reef Aquarium, PO Box 1379 Townsville.

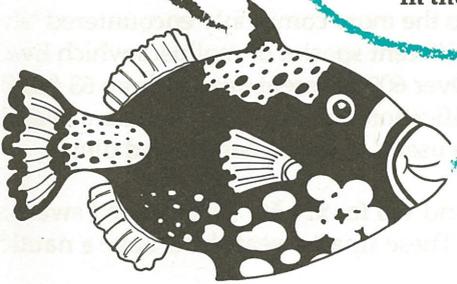
Sidney

1. Why is the Sea so strong ?

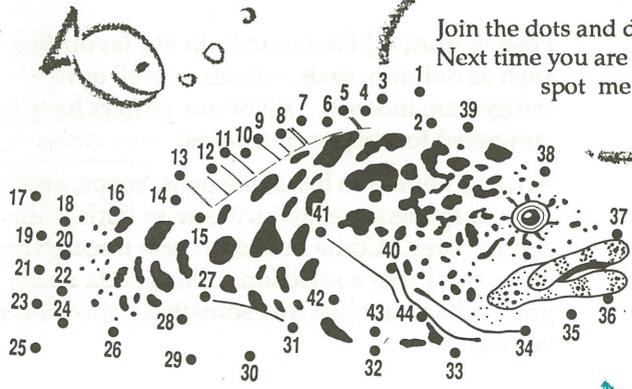
2. What is the most miserable creature in the Sea ?

2. A Whale (wail)

1. Because it has so many Mussels (Muscles) in it.



Join the dots and draw me. I'm an Estuarine Cod! Next time you are in the Aquarium, see if you can spot me in the Predator Tank.



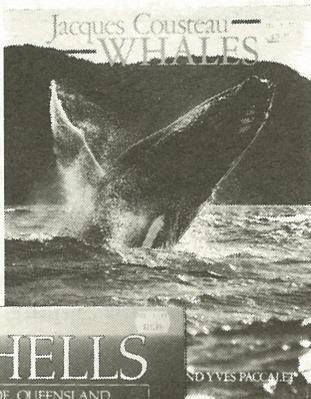
Under each letter, print the letter that follows it in the Alphabet to spell an animal in the Sea.

N B S N O T R

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TALKING SHOP

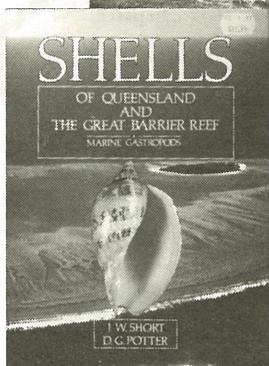
It has been an exciting time in the Aquarium Shop with lots of new items arriving - Shop staff always enjoy unpacking interesting parcels and discovering what goodies are inside.



Whales - Jacques Cousteau - \$29.99.

Whales, the most comprehensive book on the subject has been prepared by the world's best-known authority on marine life. Here in a single volume, lavishly illustrated with photographs, drawings, and paintings, authors Jacques-Yves Cousteau and Yves Paccalet offer a passport to the realm of the whale.

We learn the story of the whale's evolution - how the creatures have adapted over the millennia to life in their watery kingdom. The authors also explore the fascinating social life of the whale; their group relationships, complex 'language', subtle family bonds and other interesting forms of behaviour.

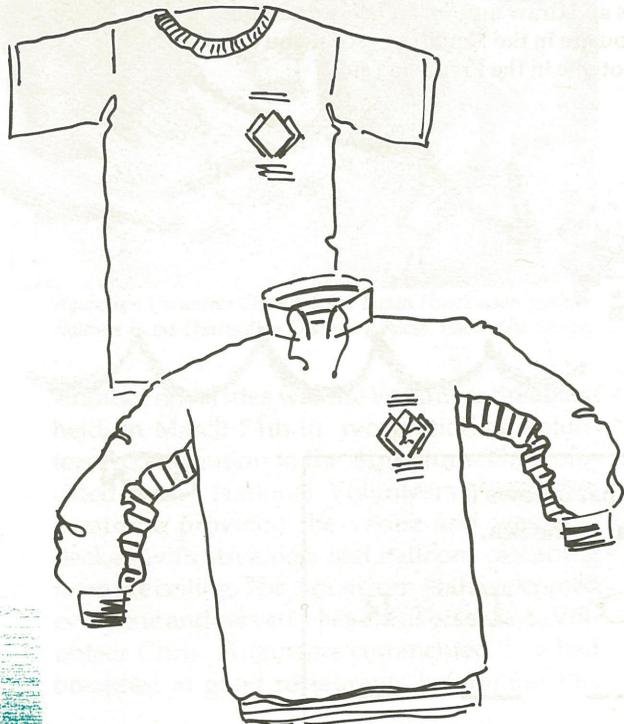


Shells of Queensland and the Great Barrier Reef - J W Short and D G Potter - \$11.95.

This book is an identification guide to the more commonly encountered 'shelled' representatives of the thousands of different species of molluscs which live in the tropical waters of Queensland. Over 600 different species from 63 families are illustrated in colour. As an identification aid the main characters of each family have been included, as well as useful notes on habitat and diet.

Aquarium T-shirts are now available in bright new colours and sell for \$21.50. Fleecy-lined sweat shirts for the cooler months have arrived and are priced at \$39.50. These smart sweat shirts have a nautical look and are already proving popular.

Tote bags in a range of fashion colours - just great to carry all of those necessary bits and pieces are in the shop. These sell for \$11.00.



Posters from R J Hatton in both old favourites such as dolphin, seals, whales as well as new designs are in stock. All of our posters have been laminated for display purposes.

Novelty items like bendable pens, soaps, erasers and sharpeners are favourites with both adults and children. Come in and browse through our stock and make a selection. Our goods make great gifts or are just that something special for yourself.

In conjunction with the Crocodile Man movie and live crocodile display the Aquarium Shop has in stock several items which will interest all crocodile enthusiasts.

The plush crocodile swaggie toy, T shirts for both adults and children, 20" vinyl crocodile and jumping crocodiles are all selling well and will be great starters for your Christmas shopping list.

Coralines