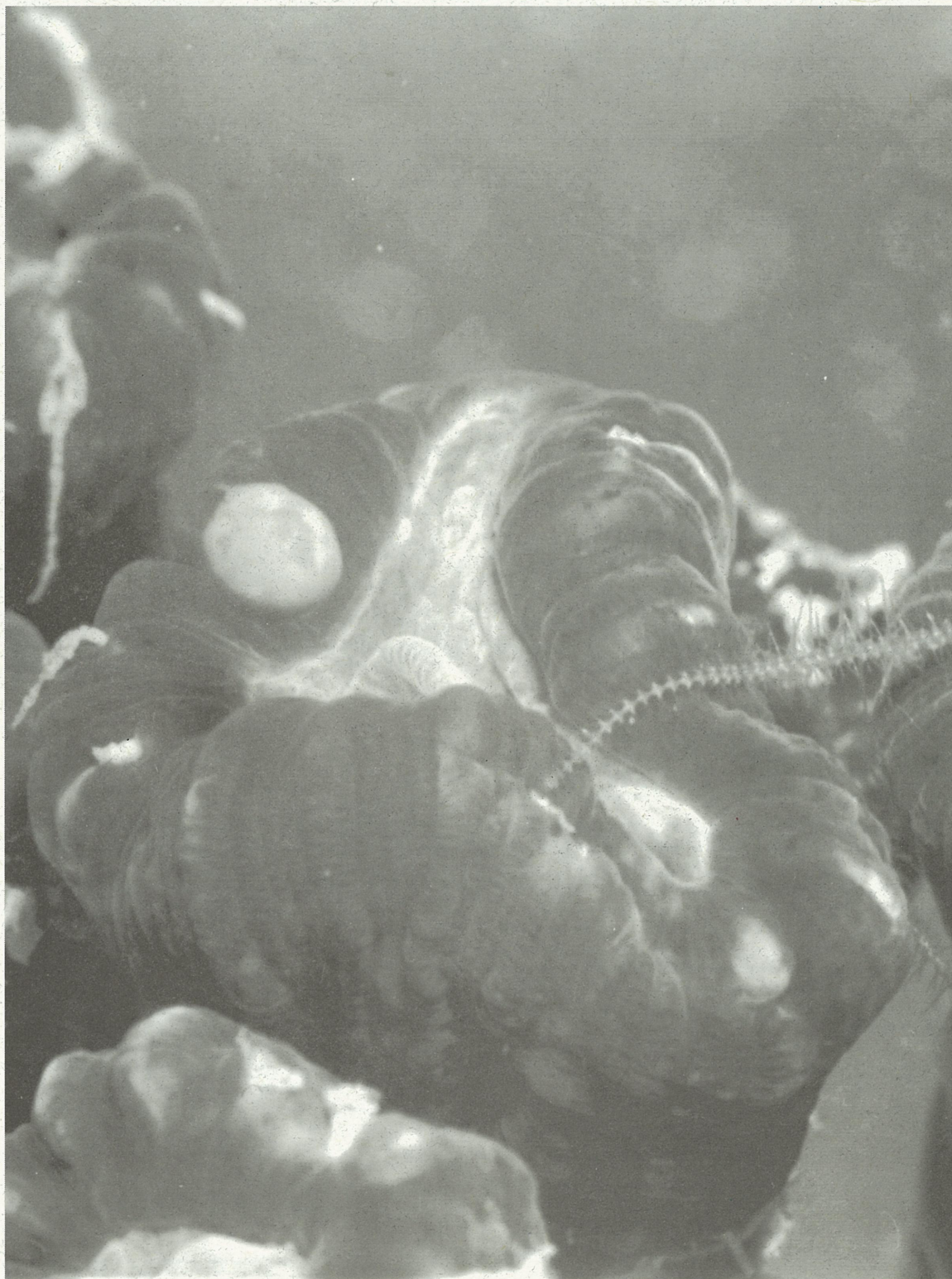


Volume 3 No 2 September 1993

Corallines

MAGAZINE OF
THE GREAT BARRIER REEF AQUARIUM



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Coralines

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The Editor, *Coralines*
Great Barrier Reef Aquarium
P.O. Box 1379, Townsville 4810

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Great Barrier Reef Marine Park Authority

STAFF

Editor: Grace Brice

Scientific Consultant: Dr Janice Morrissey

Design and Artwork: Fiona Alongi and Brian Dare

Formatted on: Apple Macintosh Computers

Printing: Image Print

Contributors

Dr David Bellwood, Department of Marine Biology, James Cook University • **Maggie Eichenbrenner**, Aquarium Interpreter, GBR Aquarium • **Martin Jones**, Curator, GBR Aquarium • **Ian Burston**, Director, GBR Aquarium • **Dianne Vella**, Education Officer, GBR Aquarium • **Grace Brice**, Promotions Officer, GBR Aquarium • **Gisela Wagner**, CSIRO Student Research Scheme, Supervisor, GBR Aquarium • **Geoff Shannon**, Aquarist, GBR Aquarium • **Anna Harrebomee**, Promotions Officer, GBR Aquarium • **Susan Hutchinson**, Guide Supervisor, GBR Aquarium • **Glenn Shield**, Exhibits Officer, GBR Aquarium • **Paul Hough**, Research Officer, GBR Aquarium • **Leanne Phillips**, Shop Manager, GBR Aquarium • **Alison Ferry**, Aquarium Volunteer, GBR Aquarium • **James Sollitt**, Omnimax Theatre

What was it that caused you to decide to become a Friend of the Aquarium?

Was it having the freedom to visit anytime without having to pay; participating in members activities such as the Aquarium Christmas Party at a lower cost than those who are not members; visiting the baby flatbacked turtles anytime you felt like it; talking to the divers every morning if you felt inclined and not having to pay a cent; maybe it was simply a desire to support a facility which you believe to be the best of its kind in the world; or perhaps because you support our work as an educational centre which encourages people to learn more about the reef?

Whatever your reason, we hope that you enjoy your membership.

Have you told your friends about the Aquarium and the benefits of membership? It sometimes seems to me that Aquarium membership is the best kept secret in the world!

But in order to offer you more, we need to grow!

With an expanded membership program we may be in a better position to offer a wider range of activities to our members. If you have any ideas for possible Members' activities we would love to hear from you.

Part of my role here in the Aquarium is to promote the Friends Program but the best advertising that I have ever known is 'Word-of-Mouth' advertising. If you are happy with the program, tell your friends; if you have concerns, don't hesitate to call me and together we'll find a solution.

Those of you who are frequent visitors to the Aquarium will know that it changes constantly. In the last issue of *Coralines* we talked about the underwater communications system, and the new Coral Cay Exhibit, which was opened by the Prime Minister.

This time things are different again. June 17 saw the launch of the Fisheries Exhibit. Mr John Lyons, Chairman, Great Barrier Reef Aquarium Advisory Board officially opened the exhibit. Professor Graeme Kelleher, Chairman, GBRMPA welcomed Mr Lyons and other guests to the Aquarium. Read Exhibit News to learn more about the creation of the exhibit.

Aquarium volunteers are to be congratulated on their initiative in setting up the National Conference for Volunteers in the Arts, Tourism, Environment and Heritage, 'Volunteers in Step', to be held in Townsville this month. Alison Ferry, President of the Volunteers Association gives us a full account of the conference in Volunteer News.

Once again *Coralines* is full of interesting stories and information. I hope you enjoy it.

Grace
Grace Brice
Editor.



Our Front Cover shows Favid coral spawning. Photo: R. Babcock.

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DIRECTOR'S MESSAGE

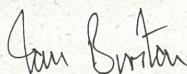
The Great Barrier Reef Aquarium is always a hive of activity both in and out of the water. While the thousands of inhabitants in the reef and other tanks busily go about their daily lives, the staff and volunteers seem to create their own busy little ecosystem. School groups, guided tours, a spot talk, a new exhibit, feeding time, craft activities, a film crew. It's all happening. And just when everything seems to be organised the unexpected happens. 'Quick, the anemone near the tunnel is eating a batfish', 'Sally-ann the black tip reef shark is having babies', or 'We have to go and rescue an injured turtle'. Is it any wonder that those associated with the Aquarium love it?

I'm proud to say that the Aquarium won two major tourism awards this year. Such acknowledgment is a real battery charger for staff and volunteers but we still need our visitor numbers to rise. We hope this will be the consequence of Townsville Enterprise Limited's active marketing of the Townsville region as a tourist destination. A recent mission to Europe and an intensive media campaign in New South Wales are among several initiatives aimed at putting our region on the tourist map. Of course we also have initiatives of our own. The first ever national conference for volunteers in the arts, tourism, environment and heritage will be hosted by the Aquarium Volunteers. This will bring people from all over Australia to experience the tropical freshness of a Townsville spring and make new contacts and discoveries in the burgeoning arena of volunteering.

As a non-profit educational facility our future lies in cooperative alliances with many individuals and organisations. The more new partners we have, the more innovative our ventures will be. Programs and exhibits for those with the yearning to know more about the Great Barrier Reef will continue to diversify. Of course our Members know that - they have that yearning.

I hope you and your family and friends take the opportunity to be part of the excitement at the Aquarium. Just read on to find out what is happening.

Come in and be part of our ecosystem.



Ian Burston
Director

Sex on the reef is a complicated affair - there are males, females, hermaphrodites, transvestites, creatures changing from female to male or from male to female; sex orgies, sex in a harem, sex parlours, happy hour sex ...

A marine creature's whole randy life seems to be about food, sex and real estate. Reproduction is the species' solution to the problem of death. However the individual of a species does not need to reproduce in order for the species to survive - but, if a large number of individuals start to lose interest in sex then that species is probably on the road to extinction.

So let's don fins and mask and peep at some Aquarium inhabitants and find out how they 'do it'.

Not only corals have sex orgies and join into a mass spawning event. Many reef creatures synchronise their spawning, like groupers (eg. coral trout), flatworms, sponges, clams, parrot-fishes, echinoderms etc.



SEX

AND REAL ESTATE . . .

Maggie Eichenbrenner
and Martin Jones

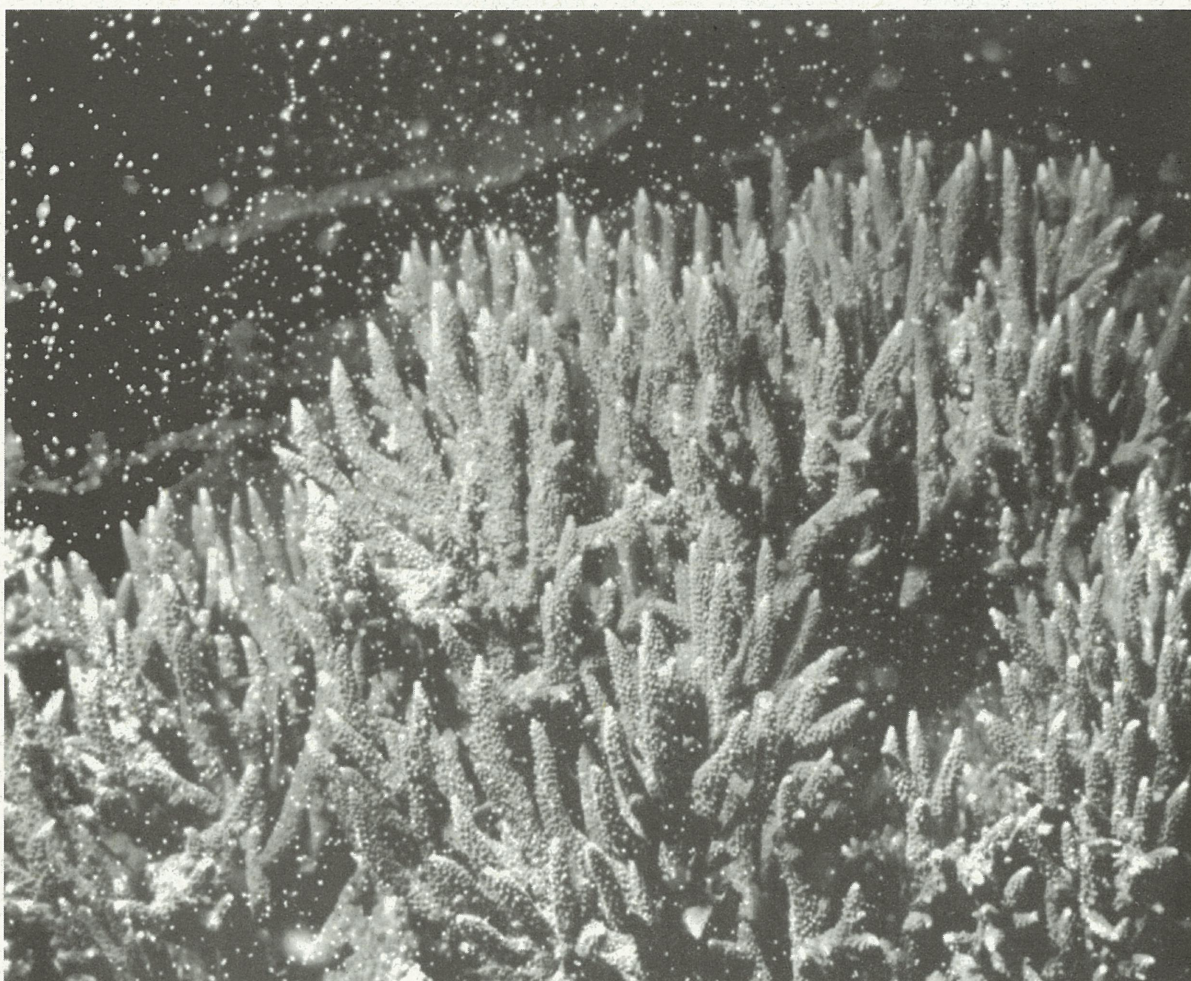
Some animals - like the sea cucumbers for example, in their diverse colours, shapes and sizes combine two forms of reproduction. One of the pink sausage sea cucumbers simply split into two one day in the touch pool. All together taking several hours, the animal started twisting itself around the middle, over and over again until it became twins, each one growing a new tail or head over the next few days. This is asexual reproduction involving one individual only, eg. budding (of a coral polyp), regenerating (of a sea star), splitting into two (sea cucumber). Here individuals are the same, they are twins or clones of each other.

When you see a sea cucumber rearing up like a snake, it is spawning. This is called sexual reproduction involving a combination of egg and sperm from two adults (the way humans reproduce). Here each individual is unique. As the sea cucumber's sex organs are in the head, they are often called funny names. Sea cucumbers are sequential hermaphrodites, in most cases starting out life as males, becoming females later.

Clownfish don't do it in a rushed spawning orgy, where post-sex products are simply dumped into the water column to take care of themselves. Clownfish take great care of their eggs. The male prepares the nesting site on the rocks beneath the anemone. When the female is ready to lay small clusters of 200-400 eggs, the male bites the anemone, causing it to withdraw from the site so he can lead his Lady to the nest, where he entertains her with dances and body nudging. The male fertilises and takes care of the eggs by fanning them with his fins, presumably to increase the oxygen.

Clownfish are always in the mood, with a peak in summer. They have been breeding successfully in the Aquarium - check out the Nursery Tank in the Discovery Room on your next visit. While clownfish only guard their eggs, seahorses are quite extraordinary breeders. They possessively attach the eggs to their bodies.

Much to the envy of the ladies, the female deposits up to 200 eggs into the



Acropora Staghorn coral spawning. Photo: R. Babcock.

male pouch while clasping tails. After 2-6 weeks, just before dawn, at the time of a new or full moon, the up-to-now pregnant-looking male has contractions and pinhead size balls shoot out of his pouch, uncurling into 1 cm long babies. We have had quite a few successful breeding sessions in the Aquarium. Some of the seahorse babies can also be seen in the Nursery tank.

The octopus takes us one step closer to complex reproduction as the octopus is literally prepared to die in order to reproduce! The sperm is produced in the head and travels down a groove between the fourth and third right arm

to the hectocotylus (copulating organ) in the tip of the third right arm (usually curled under). The hectocotylus is inserted into the syphon in the mantle of the female, where it breaks off. When an octopus puts his arm around you it could be more than a friendly gesture... The male usually dies shortly after mating (the excitement is too much for him). The female however, will go into a cave to lay her eggs, tending them for 4-6 weeks. During this time she doesn't feed and dies shortly after the eggs have hatched, virtually starving herself to death. Cuttlefish and nautilus reproduce in the same way. The blue ringed octopus only lives for

9-10 months but reproduces about 3 times in this short life!

Another complex approach to reproduction is found in some sharks and rays. As in mammals, the embryo develops in a kind of placenta. How do you tell a male from a female? The male has two finger like protrusions near his pelvic fins, called claspers. During the mating season, the female is covered with so called male love bites. Mother nature has provided her with a thicker skin on her sides so she heals quickly and usually lives to bear the scar - as you can see by looking at our three female black tips in the Predator Exhibit.

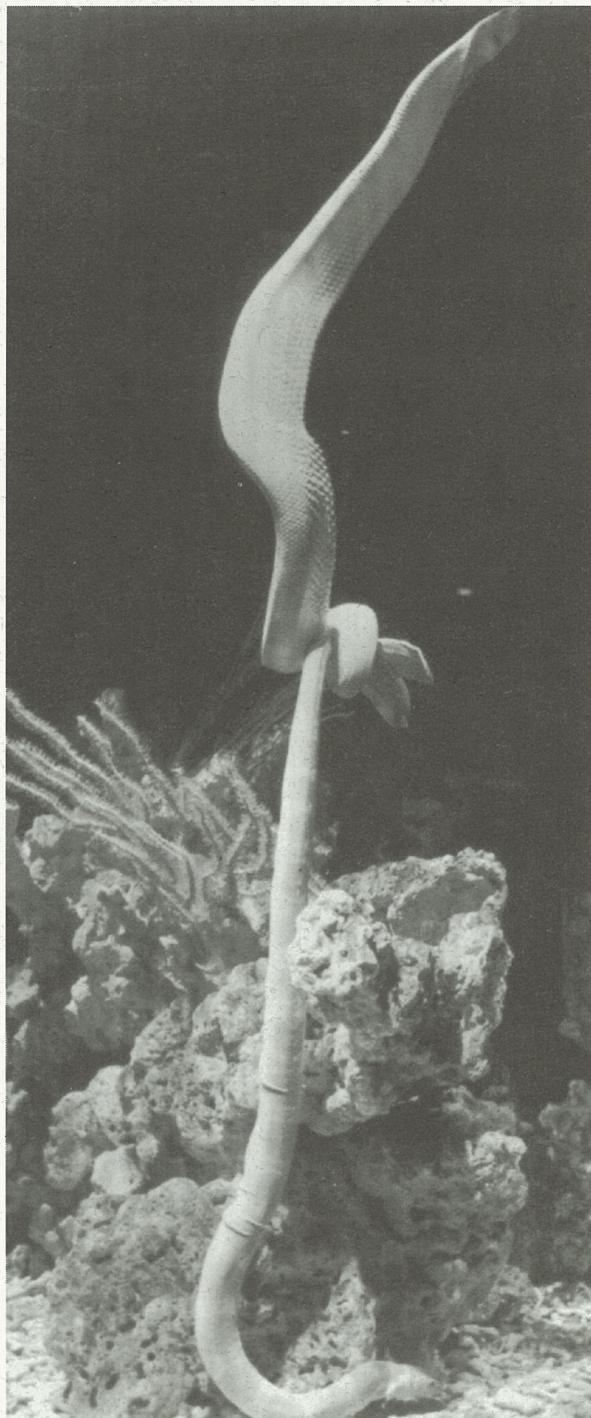
Sharks and rays can reproduce sexually in three different ways.

1. Live bearing, (like the black tip reef sharks) giving birth to many at a time. Unfortunately none of the young in the Predator Exhibit has survived very long as the other sharks eat them as soon as they are born. In the wild the female blacktip reef shark migrates into shallow coastal water, river mouths, especially mangrove and seagrass habitats to give birth, increasing the chance of survival. The young remain in these nurseries for period of a few months to several years.

2. Bottom dwelling sharks, such as the epaulette and leopard shark lay horny egg cases among rocks or under growth of coral. The embryo feeds on the yolk sac and may take a month or more to hatch.

The largest egg case on record belonged to the largest of all fishes, the whale shark, a species that reaches 15m in length. It measured 30cm in

length, while the embryo inside was 36cm long. Egg cases are often found on the beach (bring it into the Aquarium if there are signs of life in it) and are referred to as "mermaids purses".

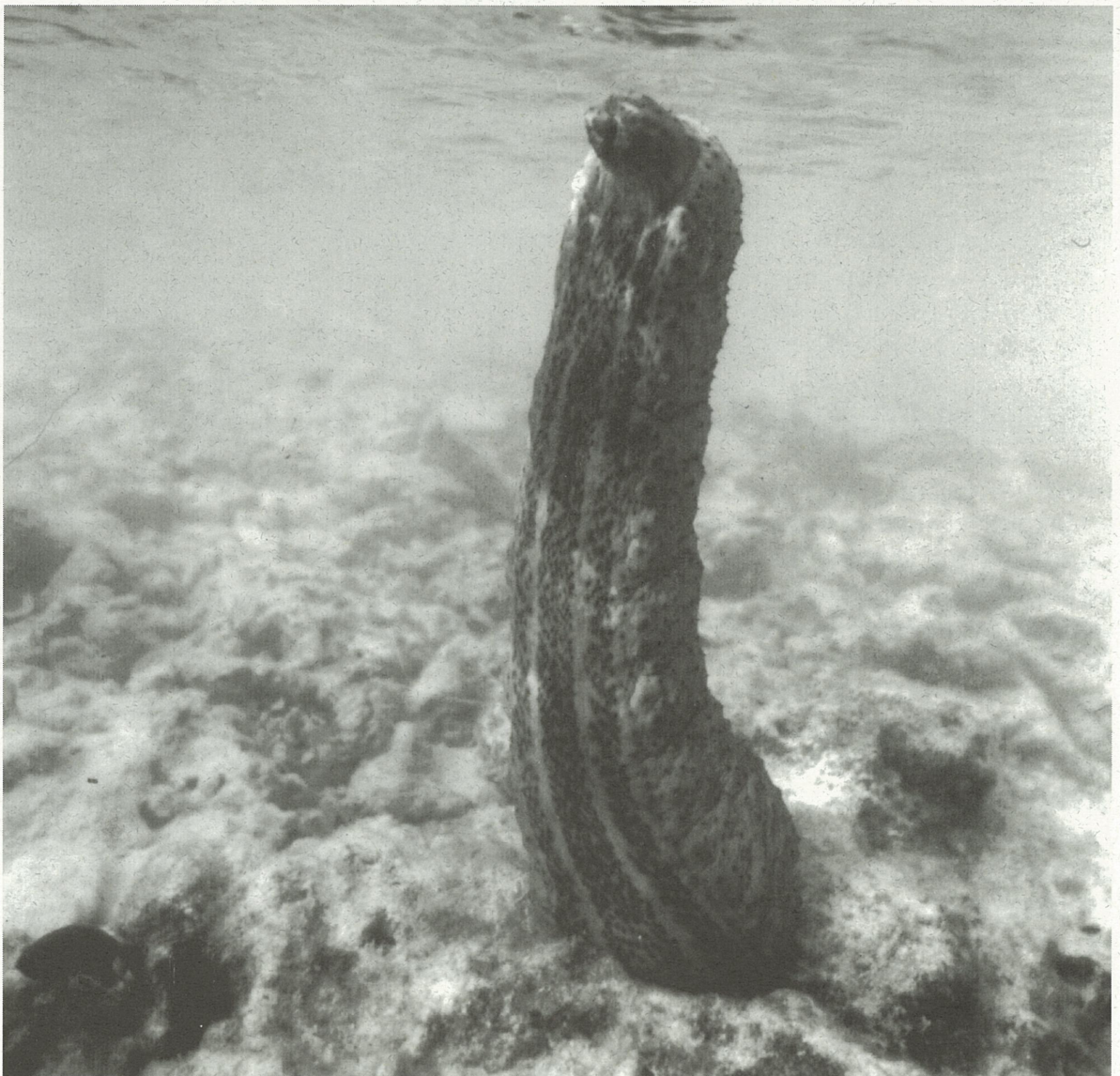


A love knot or just nature taking its course? Copulation for seasnakes is not a quick affair. Photo: Aquarium collection

3. A third type of sexual reproduction occurs in the grey nurse shark. This shark also produces eggs but the eggs hatch inside the female, and feed on the unfertilised eggs around them killing their unborn brothers and sisters. This is called uterine cannibalism.

This seemingly idyllic, colourful world can sometimes be a tough place for a reef creature after good food, sex and real estate. A low reproduction rate

occurs in many species. Careful management and cooperation of every reef user is therefore an absolute necessity. If we do the right thing, our children will reap the benefits which the reef has to offer!



Seacucumbers rise to the occasion when they spawn. This one Holothurian bohadschia, is no exception. Photo: Aquarium collection.

FRIENDS NEWS

Anna Harrebomee/Grace Brice

International Photographers see potential in Aquarium

There have been many exciting things happening in the Aquarium over the last few months. We have been fortunate enough to have two world class photographers visit the Aquarium recently. David Doubilet, *National Geographic* underwater photographer and author of the recently published *Pacific - An Underwater Journey* visited the Aquarium for two weeks. David used scenes in the Aquarium for a future *National Geographic* article which we can't tell you about yet. While at the Aquarium, David also took some black and white photos to enlarge our own collection.

Anne Geddes, award winning photographer of baby calendar fame, also saw great potential in the Aquarium. She approached us to assist with her next calendar for the Child Protection Trust. Anne planned to use the giant clams with one set of identical twins asleep in the shells. Anne waited patiently for five hours for the children to fall to sleep. Unfortunately the twins had other ideas. In

the end Anne reluctantly abandoned the shot - the first time she has been forced to do this. Anne's patience with the children explains why her calendars are so delightful.

During the first week of July we played host to the film crew of *Neri the Ocean Girl*. This film is the story of Neri, a mysterious young girl from the ocean and her discovery by young inhabitants of an underwater city. Neri's only friend is a humpback whale with whom she communicates by mental telepathy.

July also kept us busy with *Quantum*, *A Question of Survival*, *Behind the News*, *Totally Wild* and *Eco-Televisa*, a network from Mexico.

Aquarium Sleepout

Have you ever wondered what happens in the Aquarium after dark? The younger members had the opportunity to find out when they arrived at dusk armed with sleeping bags and left after breakfast the following morning.

All the night time feeders are out - the sea urchins grazing the rocks, the rabbit fish



So much like the real thing, our Coral Reef Exhibit is filmed by the *Quantum* team for a story on an underwater computer. Photo: W. Gladstone.

hunting for food. The sharks just cruise about, as they do during the day. Finding a parrotfish asleep in its mucous sleeping bag which hides its smell from others makes for a great discovery as does being witness to first light on the coral reef.

The youngsters love to be involved in something different. We have only one sleepover this program and it will book out early. See the Activity Liftout for details.



Neri leaves her ocean world during a break in filming of the 'Ocean Girl' series at the Aquarium.
Photo: Westbridge.

Aquarium takes out Tourism Award.

The beauty of the Great Barrier Reef Aquarium and the work it does in reef education was acknowledged in May when we were the proud recipients of the Environmental Tourism Award. These awards are conducted annually and are given in various categories. Our entry will now be taken from the regional to the state-wide level. We wait with anticipation to see the results.

Aquarium Birthday Party

Spirits were high when the Aquarium celebrated its 6th birthday in June.

Party hats were made during the craft session, King Neptune entertained the children in the Hug-a-Polyp Reef, student volunteers presented a play and of course no party is complete without a cake!

Visitors whose birthday fell on that day had the opportunity to enter a draw to win a free membership. The winner was Karl Conlan, aged 9, from Alligator Creek. We hope that the Conlan family enjoy their membership.



The cast of 'Alice in Aquarium land' - our Student volunteers - receive applause from the 120 children at the Aquarium Birthday Party.
Photo: Rob Parsons.

ACTIVITIES

SEPTEMBER 1993 - FEBRUARY 1994



The following activities are free with membership or Aquarium admission.

*Theatrette Presentation

on the Great Barrier Reef:

10.00 & 11.00 am & 12.00 noon, 1.00,
2.00, 3.00 & 4.00 pm (Daily)

*Diver Talkback:

10.30 am (Daily)

Facts and answers to your questions from a diver in the water of the Coral Reef Exhibit.

*Guided Tour:

11.20 am & 2.20 pm (Daily)

*Turtle Feeding:

12:20 pm (Daily)

*Marine Cuisine:

Either Tuesday or Wednesday and either Saturday or Sunday at 3:20 pm. See how and what some of the Aquarium animals eat.

*Shark Talk followed by shark feeding:

Sunday, Tuesday and Thursday 3:30 pm. The feeding is often preceded or followed by a talk on sharks.

*Kids' Corner

(a craft session for children):

Saturdays and Sundays 11.00 - 12.00 am
& 2.00 - 3.00 pm. September and
Christmas School Holidays: 11.00 am - 12.00
noon (Daily)

*Discovery Sessions:

2nd and 4th Sunday of the month,
1.30 - 2.30 pm. Discovery sessions are an
opportunity to have an in depth look at
various marine topics. The aim is to help
members gain a greater appreciation of the
marine environment and its inhabitants.

Other activities may be scheduled during
the day, please phone to confirm times.

** The Aquarium reserves the right to cancel
or change program times. To confirm daily
events please telephone the Aquarium on
(077) 818886 Monday to Friday and
(077) 818891 weekends only.*

1994 VOLUNTEER INTAKE

GBR Aquarium volunteers donate their time and considerable talents to help the Aquarium expand and improve its services to the public. Depending on your time, talents and interests you can assist in a wide range of Aquarium activities: guiding, assisting with Friends and Schools programs, clerical assistance, helping behind the scenes and some animal husbandry. Application forms available at the front desk from 15 February.

An open night for prospective volunteers will be held on 1 March from 7.00 - 9.00 pm. Find out exactly what volunteers offer the Aquarium and what the Aquarium offers volunteers. Applications close on 1 March.



GREAT BARRIER REEF
AQUARIUM

UNDERWATER DREAMERS

A night for families, individuals - anyone interested in the Aquarium after dark.

What happens when the doors close? The Reef Tank takes on a completely different look. Aquarium interpreters will delight in guiding you through this nocturnal world. Activities for the children will also be included.

Date: Friday, 8 October, 1993

Time: 7.30 pm - 9.30 pm

Cost: Members

\$10 - Family of 2 adults and 2 children
(\$3 for each additional child)
\$5 Individual.

Non-members

\$30.00 - Family of 2 adults and 2 children (\$8 for each additional child)
\$15.00 Individual.

Bookings Close: Friday, 1 October, 1993.

Minimum: 10 families

REEF REACTIONS

Sharing the Sense of Wonder

Make the most out of an Aquarium visit with your children. In this workshop, designed specifically for parent and child teams, the amazing colours, shapes and movement of life in the sea are explored through activities and crafts.

Date: Saturday, 23 October, 1993

Time: 9.30 am - 11.30 am

Cost: Members

\$10.00 - Parent and Child Team
\$15.00 - Parent and 2 Children Team

Bookings Close: Friday, 15 October, 1993

Maximum: 20 teams

NIGHT STALKERS

What is in store for those adventurous enough to come to the Aquarium after dark? What exciting activities are part of this experience? Join us on 5 November and find out just what does happen when the lights go out.

Bring your own sleeping bag and torch. Light supper and breakfast provided.
NO PARENTS ALLOWED!

Ages: 6 - 12 years

Date: Friday, 5 November, 1993

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 \$18.00
3rd child \$21.00

Bookings Close: Friday, 29 October, 1993

Minimum: 20 **Maximum:** 30



BEHIND THE SCENES TOUR

For Members only.

Do you know what goes on behind the scenes at the Aquarium? Join our curatorial staff on tour and find out how the algal turf farm works, what the predators eat and all the other behind-the-scenes things you have always wanted to know.

Book early, its for members only and its free! All children must be accompanied by an adult.

Date: Sunday, 21 November, 1993

Time: 3.00 pm

Cost: Members only. Free of charge.

Bookings Close: Monday, 15 November, 1993

Minimum: 10. **Maximum:** 20.

CHRISTMAS PARTY

A night of celebration of Christmas.

Have you ever wondered how Santa arrives at our Christmas celebrations? Landing a sled on a coral reef is difficult and each year Santa has to find a solution to this problem so that he can bring gifts to the children waiting for him in the Aquarium.

Bring your Mum and Dad and help us celebrate a reefy Christmas in the Aquarium.

All children must be accompanied by an adult.

Date: Friday, 10 December, 1993

Time: 6.30 pm - 9.30 pm

Cost: Members

Adults \$13.50
Children \$9.00

Non-members

Adults \$16.00
Children \$12.00



Bookings Close: Friday, 3 December, 1993

Minimum: 80 children

A light supper will be provided.

Children aged 12 years and under will receive a gift from Santa.

Book and pay early to avoid disappointment! Use the booking form when you book at the Aquarium Office or Shop. For further information or additional booking forms, please contact GBR Aquarium Office, P.O. Box 1379, Townsville OR Phone (077) 81 8886 Mon-Fri 9 am - 4 pm.



EDUCATION NEWS

Dianne Vella

As the days fly by, the Schools Program keeps the Aquarium abuzz with activity. With three school terms completed and one to go, it is time to round the final turn as the end of the year draws closer.

Edcamp '93, run in conjunction with the Department of Tourism, Sport and Racing proved to be highly successful. Participants, all teachers from as far away as Mt. Isa, enjoyed the range of activities and varied presenters. This two day workshop on Magnetic Island introduced teachers to a range of environments and habitats. It will be held again in 1994 and details will be available in the next edition of *Coralines*.

Over 700 students from the U.S.A. enjoyed sleepovers at the Aquarium during June, July and August. The students were taking part in a visit to North Queensland's significant environmental attractions: reefs and rainforests. Many were fascinated to come face-to-face with the Great Barrier Reef for the first time. Others commented that the Aquarium provided them with a greater appreciation of the Reef and its many inhabitants. An all-day and all-night program had students learning how to feed a crayfish, seeing fluorescing corals, hear about how the Marine Park is

managed and talking to the divers through the Diver Talkback Show.

The Rotary sponsored Student Researcher Program continues to be even more successful. As a result of this program, additional students are able to take part in the Student Research Scheme in association with CSIRO, under the watchful supervision of their predecessor Gisela Wagner. It is an invaluable experience for each of the students involved, allowing the more experienced students to provide insight and relate their experiences to newcomers in the program.

An inservice for teachers of Geography was held recently to introduce many of them, for the first time, to our Reef Tourism education program. We were able to utilize the services of GBRMPA staff who are well experienced in the impact management area of tourism. As people become aware of the careful management of tourism on the Reef, more and more teachers are searching for alternative teaching techniques for such a unit and the Aquarium provides the perfect setting.

Upcoming teachers' workshops include an inservice for early childhood teachers and activities are planned to coincide with Artists' Day in October.



Participants in Edcamp '93 enjoy a reef walk at Cockle Bay, Magnetic Island. Photo: Di Vella.



Forging a link ... Australians also enjoyed taking part in the U.S.A. Independence Day celebrations at the U.S. student sleepovers in the Aquarium. Photo: Rob Parsons.

Open House for Educators' - scheduled for 15th February (Primary teachers) and 22nd February (Secondary teachers) in 1994.

A wide range of activities is possible in the Aquarium. We have spent a lot of time listening to teachers' needs and finding out all sorts of approaches to education to ensure each visit is successful. We would be pleased to discuss these with you, or talk with you about your ideas. We encourage teachers to make an appointment with the Aquarium Education Officer by telephoning 81 8890 (direct number).

EVERYTHING YOU WANTED TO KNOW ABOUT OUR EDUCATION PROGRAMS BUT WERE AFRAID TO ASK.

Once again the Aquarium will be offering educators in the Townsville region the opportunity to visit and become informed about the range of programs offered.

The Omnimax Theatre, Museum of Tropical Queensland and Wonderland Marketing Office are also participants in these events. This is a once-a-year opportunity to examine the range of programs offered by the three attractions of the Wonderland Complex.

Dates: Tuesday 15 February for Primary School teachers and 22 February for Secondary teachers.

Time: 4.00 pm

Place: Foyer, Omnimax Theatre

Bookings: Telephone 81 8886

Bookings Close: 11 February (Primary), 18 February (Secondary)



"What is that thing? Can I touch it?" School children find out during a Schools program at the Touch Pool. Photo: Glenn Shield

E X H I B I T N E W S

Paul Hough and Glenn Shield

What is this thing called Kreisel ?

This exhibit has provided rare insights into the creative thinking processes of visitors to the Aquarium (some of the answers on the board are amazing) and describes the considerable effort required to give life to the ideas and creative talents of Aquarium staff. The Kreisel display has been expanded to show the steps in the birth and construction of a new display. It will use *Acetes* (zooplankton) and *Ctenophores* (comb jellies) and interpretive material associated with captive displays as examples of this process.

Marlin commando !

Once again - it's Marlin season. Curatorial staff are attempting to catch an appropriately small Marlin for the Predator Exhibit so stay tuned for further billets!

Nursery lines

The mangrove tank focuses on the juvenile forms of life (especially fish and crustaceans) found in this vital ecosystem and highlights the importance of its role as the nursery for a multitude of organisms. Aquarist Ian Preece has modified the tank to include above and below water components as well as live mangrove trees.

Invisible filters

As part of the continual process of display repair and modification necessary for public exhibits, Aquarist Geoff Shannon will be relocating the filter systems for two of the three stand-alone tanks to an area under each tank. The filters are on top of the tanks and clearly visible to visitors. They will be fundamentally unchanged except that access will be easier and they will be out of sight.

Q - room with a view

In an effort to optimise the facilities and space within the Quarantine Room, aquarists will be rationalising individual tank stocking levels and aquarium systems with a view to creating dedicated areas that will be used for exhibit design, research and development.

Gone Fishing

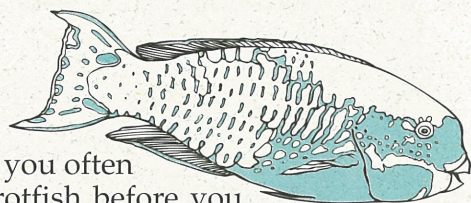
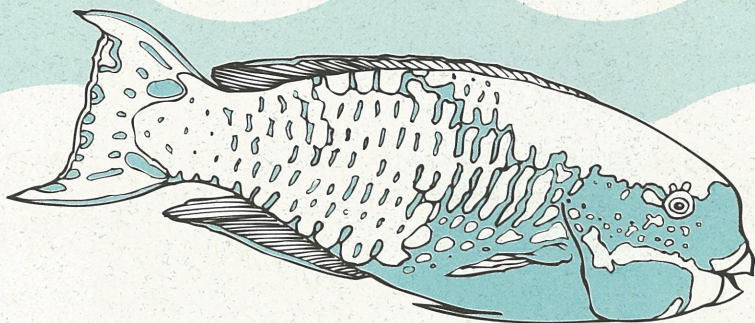
Now that the fisheries exhibit has become a familiar and respected feature of the Aquarium, it is time, perhaps, to reflect on how it got there. In some way it has involved

nearly everybody on the staff of the Aquarium. After the concept was created and designed by Gavin Ryan, a local artist from Magnetic Island, numerous other hands sprang into action. The GBRMPA production unit under the guidance of Andrew Elliott helped streamline the concept into a practical exhibit design and computerised images to make evaluation and label production relatively simple. Loretta Saunders formed the political framework while Roy Bagust constructed the solid framework and walls from timber. The workshop team of Tony Steele and Barney Bebendorf was responsible for nothing that can be seen. Underneath, however, it is their welded stands, waterlines and drainage and alarm system that not only support the wet exhibits but keep them running. The wet portions of the exhibit were coordinated by Curatorial Manager John Hoey with aquarists Warren Hayden, Ian Preece and Gabrielle Qwakawoot devising and constructing systems to keep the live exhibits (donated by local trawler operators and AIMS) comfortable and happy in their watery environment. Signwriter Rob Isaacs made it appear possible to word process onto a painted wall with his meticulous lettering.



Many hands made light work of positioning the tank as Aquarium staff put their backs into putting it into its final resting place in the Fisheries Exhibit. With the help of a hacksaw it fitted perfectly. Photo: Andrew Elliott

INTRODUCING



Dr David Bellwood

Parrotfishes are so called because of their unique beak-like jaws and brilliant colours reminiscent of parrots in the equatorial jungles of South America and Asia.

Parrotfishes are found on coral reefs throughout the world. Of the 79 species of parrotfishes known, 28 are found on the Great Barrier Reef, where they are a dominant group of grazing fishes.

The parrotfishes belong to a single family scientifically known as the *Scaridae*, with the largest group being found in the genus *Scarus* - an ancient Greek term for parrotfish. Indeed, both the Greeks and the Romans knew of parrotfishes way back in ancient times. Parrotfishes in the Mediterranean Sea were considered a prize food fish by the Romans. Today, parrotfishes are still eaten in many Asian and Pacific nations. The name *Scarus* was derived from the ancient Greek term *scarizo*, meaning 'to take to pasture'. The Greeks obviously knew how these fish fed.

On reefs, you often hear parrotfish before you see them - a steady clicking sound in the distance gives away their presence, as they calmly feed on the surface of the reef.

When you first see parrotfishes, their spectacular colours mean you'll never forget them. Parrotfishes are undoubtedly among the most colourful fishes on the reefs. Their beauty belies a fascinating life history.

Most parrotfishes feed by scraping algae from the reef using their powerful beak-like jaws. However, there is one species which eats live coral. The largest of the parrotfishes, the hump-headed parrotfish (*Bolbometopon muricatum*) can grow to over 1.2 m long. At this size they can easily break off thumb-sized pieces of coral. Approximately half of their diet is live corals, especially *Acropora* species.

They snap off pieces of branching corals and bite away the edges of plate corals like a child would nibble on a large biscuit until only a small central disk remains. The vast majority of parrotfishes feed on the thin layer of turf algae that covers

PARROTFISHES

the reef. Only during the first few weeks of life do parrotfishes feed on other things. Juvenile parrotfishes,

less than 1 cm long and having just settled from the

open water,

start feeding on copepods small crustaceans in the turf algae. At this stage the parrotfishes have large teeth and lie in wait in the turf algae waiting to pounce on passing copepods like a coral trout pounces on the adult parrotfishes.

The feeding biology of parrotfishes reflects the interesting anatomy of their digestive system. Once swallowed, the algae and sand are ground into a fine paste by a special set of teeth in the throat known as the pharyngeal apparatus. The pharyngeal apparatus contains two sets of bones which bear rows of teeth. The teeth move along the row like a conveyor belt with new teeth arising at one end to replace teeth at the other end as they wear out. When processing the food, these rows of teeth are moved over each other grinding any material in between. It is no wonder that the faeces of parrotfishes resemble ground-up coral sand.

Parrotfishes are a major source of sand on reefs. Some large individuals may

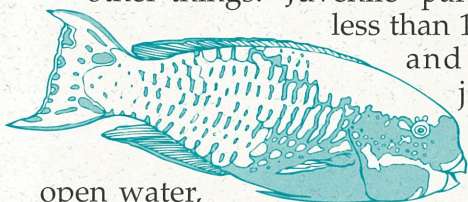
produce up to a cubic metre of sand per year! A lot of this sediment is very small ($<63\mu\text{m}$) and therefore technically mud. This material stays in suspension for a long time and can have drastic effects on visibility. The defaecation of schools of *Bolbometopon muricatum* produce a

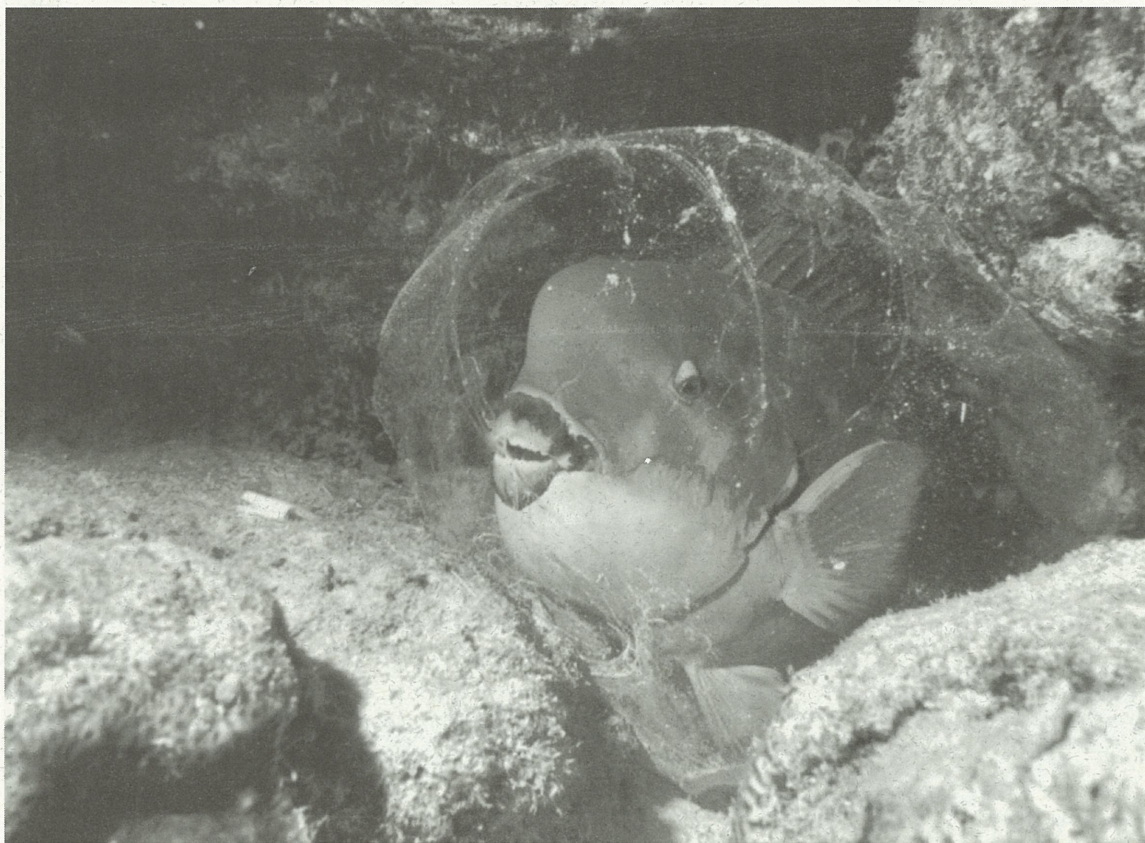
localised 'snow storm'.

Indeed, the falling visibility in the Great Barrier Reef Aquarium late on a summer afternoon may be partially blamed on parrotfishes. They are, however, worth any inconvenience given their showy colours and active dispositions.

It is interesting to note that parrotfishes have no stomach. However, they do have sacculated intestines. This type of intestine is unique among fishes but is very similar to the large colon of humans, pigs, rabbits and elephants. It is suggested that this may be a result of the type of material found in the guts a relatively thick slurry of rough material.

If parrotfish feeding is interesting, their sex life is absolutely fascinating. It is extremely complex and is characterised by changes in colour, sex and behaviour.





The green parrotfish, *Scarus gibbus*, at night. Most parrotfishes hide in caves in the reef and amongst the corals at night, some like this parrotfish secrete a temporary 'sleeping bag' in the form of a mucous cocoon. It is believed that this cocoon protects parrotfishes from nocturnal predators such as moray eels. Note the powerful beak-like jaws with which this species bites off pieces of the reef. Photo: N. Collins.



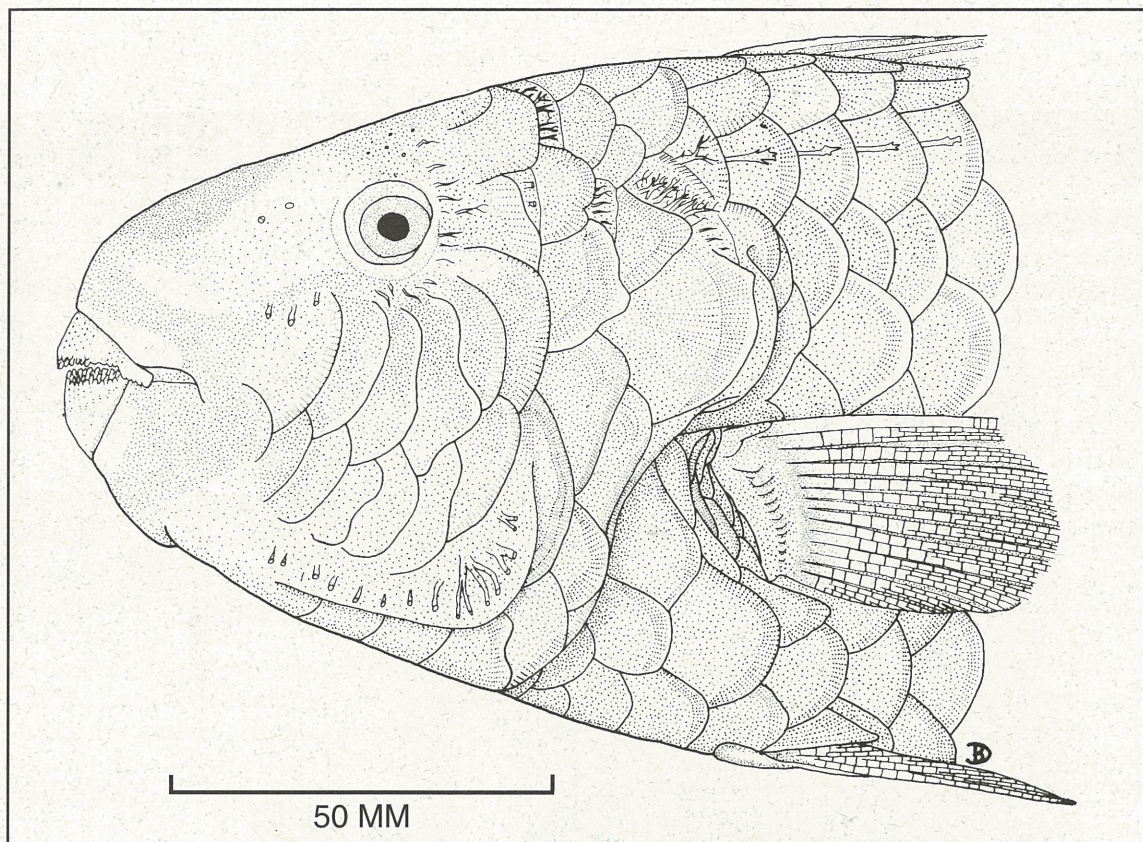
Most parrotfishes change sex at some point in their adult lives. We describe them as protogynous hermaphrodites - this means they change sex from being female to male. To complicate matters, sex change is usually accompanied by colour change. Most parrotfishes have two colour phases as adults. Usually the bright colourful one (the Terminal Phase) is male and the less colourful one the female (the Initial Phase). However, in some species a small proportion of these drab (Initial Phase) individuals are males. For years, these colour differences have fooled many people into identifying the different sexes of the same species as two different species. It was only in the 1960's that the male and female colour phases of the same species started to be linked!

When you look in the Great Barrier Reef Aquarium today, there are about eight species of parrotfishes but there are at

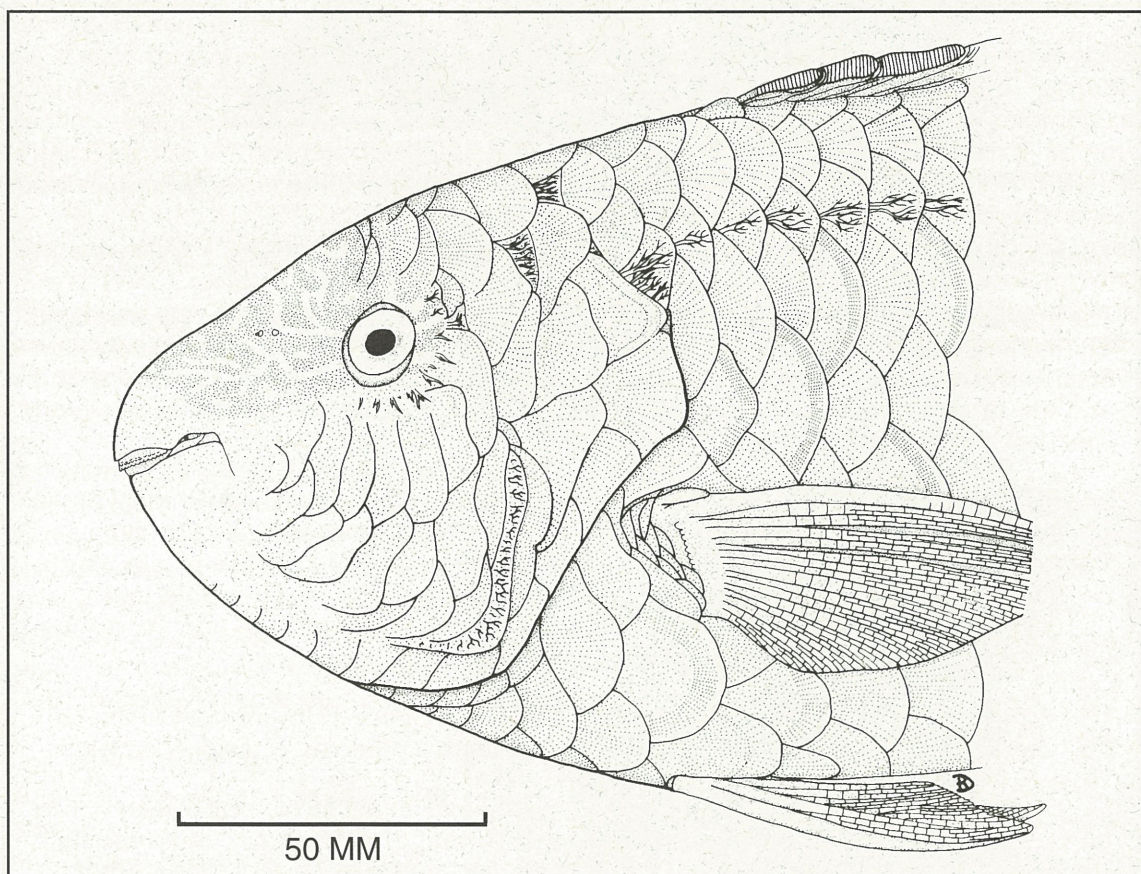
least thirteen colour phases. The Initial Phase individuals may also display several colour patterns which can change rapidly, often in a few seconds, as the result of fright or mood. In one species (*Scarus sordidus*) there are five possible basic patterns displayed either individually or in combination.

The following species may be seen in the Aquarium: *S. sordidus*, *S. psittacus*, *S. gibbus*, *S. chameleon*, *S. schlegeli*, *S. frenatus*, *S. flavipectoralis* and *S. niger*.

At night many parrotfishes sleep in a mucous cocoon. This is also seen in many wrasses. This mucous cocoon has an opening around the mouth through which the fish breathes, but otherwise it encloses the body. It has been reported that the mucous has an unusual composition which is unpleasant to taste or smell and that it repels nocturnal predators such as moray eels that feed by smell or taste at night. The role of



Scarus sordidus.

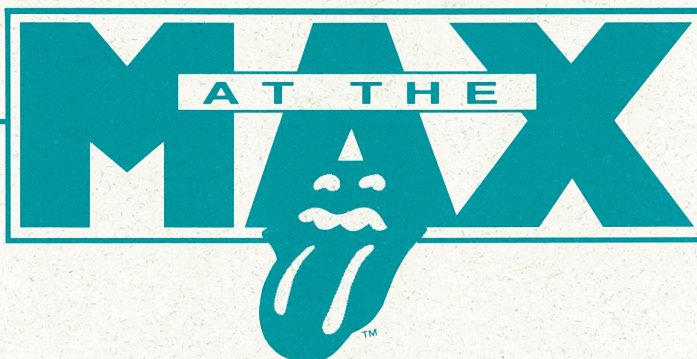
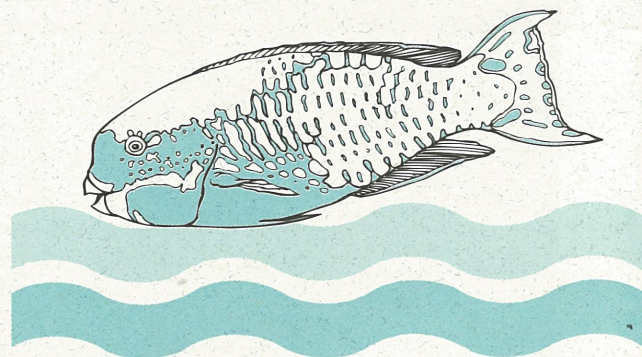


Scarus frenatus. Illustrations by the Author

mucous in wrasses is less clear but it may have arisen as a means of protection and to assist in breathing in those species that burrow in the sand to sleep at night.

Parrotfishes have been around for a long time. The oldest fossil was discovered only three years ago in Austria. It was found to be approximately fourteen million years old. At that time large parts of Europe were covered by a shallow tropical sea called the Paratethys. This fossil parrotfish was almost identical with some parrotfishes found on the Great

Barrier Reef today. The unique features of the parrotfishes have obviously served them well all these years!



James Sollitt

The Townsville Omnimax Theatre was the first of its kind in the Southern Hemisphere. The rolling loop film transport system was invented by Ron Jones, an Australian engineer. The three story high dome screen has thousands of tiny holes to allow sound and air to move through it and positioned around the theatre are seven banks of speakers generating 2100 watts of audio power.

The Great Barrier Reef film is one of the best shown at the Omnimax Theatre. Most of the film shows captivating underwater scenes - moray eels, clown fish, coral polyps and jelly fish. The sea is like a great costume ball with animals that look like plants, sharks that look like coral, fish that look like butterflies and a shovel-nose ray that looks like the ocean floor. Starring are marine biologist Soames Summerhays and Australian underwater photographers, Ron and Valerie Taylor.

The alternate daytime screening is *Blue Planet* - a Space Film about Earth. This documentary combines beautiful cinematography with a powerful ecological message.

On Thursday, Friday and Saturday evenings, participate in the most spectacular concert movie ever made, *Rolling Stones at the Max*. 'A torrent of gargantuan, mind-swelling sights and jagged roaring sounds. It drenches the ears and eyes.' - *Los Angeles Times*.

VOLUNTEER NEWS

Alison Ferry

An initiative taken by the Volunteer Association this year is that of hosting a National Conference for volunteers in the Arts, Tourism, Environment and Heritage. It will be held at the Sheraton Breakwater Casino-Hotel on September 8, 9 and 10 and registrations have come in from as far away as South Australia. For the first time in Australia, volunteers in those areas will gather to share ideas and experience in an important national forum. The keynote speakers are among the best in their field and include Peter Hiscock, President of the Australian Trust for Conservation Volunteers, Carol Serventy, President of the Australian Federation of Friends of Museums and Diane Morgan, Foundation President, Australian Association for Volunteering.

The aims of the conference are to achieve excellence in volunteer programs by sharing the experience of volunteering, to provide assistance in setting up, developing and maintaining volunteer schemes and to develop strategies and policies for volunteer organisations within the fields of Arts, Tourism, Environment and Heritage.

After attending a southern-based conference during 1992 I realised that despite the fact that there are hundreds of volunteers working in areas such as ours, most conferences and workshops appeared to cater for volunteers working in the welfare area. The needs of our volunteers are quite different and after discussion with Volunteer and Aquarium Management it was decided that with the skills and talents contained within our team of volunteers, it would be possible for us to host the first National Conference for Volunteers.

The Volunteers Association is pleased to have taken the opportunity to host this conference and takes considerable pride in the role our volunteers played in its organisation.

The volunteer organised courses, Coral Reef Biology and Coral Reef Ecology, which ran in March, May and July this year enjoyed great success. We have found these to have great appeal to locals who wish to learn about the reef, the diving fraternity, pleasure boat owners, fishermen and those who are simply interested in the environment.

The Aquarium is now six years old and volunteers have been assisting in the daily operation of the facility for almost as long. Our eighth training course was run in March and we welcomed nearly forty members into our midst. The program has grown from a relatively small level of involvement in 1987 to providing a vital support role to the Aquarium today. The level of commitment of the volunteers can be seen in the number of hours worked which, for 1992, was 10,000!

Ongoing training for volunteers takes many forms. Working with school groups, excursions to Kelso Reef, weekends on Pelorus Island and snorkelling around Magnetic Island provide opportunities to expand skills. These provide a fun component as well as a learning experience and volunteers look forward to participating in them. The rewards for being involved in the scheme are enormous but sometimes not quantifiable.



CURATORIAL NOTES

Corals Under Stress

The Aquarium's Rotary Summer Science Student Employment Program earlier this year presented me with the perfect opportunity for some research into coral biology. In my study the effect of fragmentation on the reproduction and health of the coral, *Pocillopora damicornis*, was investigated. Specifically, I looked at whether the size of the fragment effected the efficiency of the coral's stress compensation.

The answer to this question is not a hard and fast response. The conditions in a laboratory even with the best attempt of natural imitation, are vastly different to a delicately balanced coral reef ecosystem.

By fragmenting the *P. damicornis* into various sizes, with consequent daily monitoring over a period of many days, it can be established whether a significant relationship exists between the size of a fragment and its stress management. In this particular experiment *P. damicornis* colonies were sampled from off Bay Rock, Townsville. Fragments of various sizes were placed in flow-through tanks at the Aquarium and monitored daily. A replicate of the experiment followed.

After no less than 10 false alarms it was established that no planula was observed from any of the fragments. To me this indicates the energy polyps use for reproduction is redirected to individual immediate survival. The degree of polyp extension, mucus production, percent of bleaching and even polyp bail-out were used as indicators of coral health as a response to fragmentation. Statistically no direct relationship between fragment size and stress compensation could be determined.

This research, while answering some questions posed many more. For example, do the results indicate that the polyps function as separate individuals?

A more advanced simulation of reef conditions, i.e. water currents, nutrient availability etc would bring more conclusive results.

This research was funded by the Rotary clubs of Townsville as a part of the Rotary Summer Science Students Scheme. Although making its debut this year the scheme is proving to be the initiator in the transformation of to-day's science students into tomorrow's scientists.

Gisela Wagner

The small, the cute and the cuddly

A father's lot is beset with trials! The baby eels need this, the baby pipefish needs that, the baby scat needs something else. One could be rushed off one's feet. No time for 'nappies'. And, where are all these babies? Well! They're in the Nursery tank in the Discovery Room.

And why a Nursery tank? Well! we all love to see babies, they make us 'Coo' and their antics are a joy to observe.

Our bay is full of fish and many are unrecognisable as babies. So, I wanted to see 'what became what' as it grew.

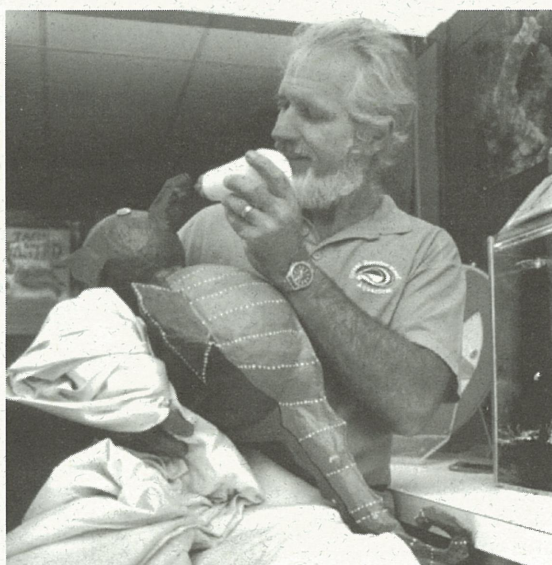
A small tank was set up, and the collecting began. The tank has proved to be a real point of interest to visitors in the Discovery Room.

Since it's set-up we have seen a host of tiny fish come and go and a multitude of people likewise after having pressed their noses up against the glass to see the infants at play.

We also have been able to show off our own 'progeny', such as the coy yet seductive sea-horses or the bustling clownfish and, though not our offspring, we cannot forget the magic that was the Skeleton shrimp as they 'loop-de-looped' in stick-man fashion.

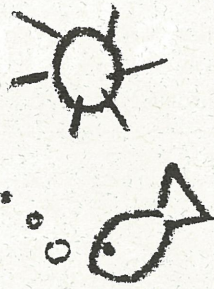
I hope this small tank may continue to bring enjoyment and knowledge to us all.

Geoff Shannon



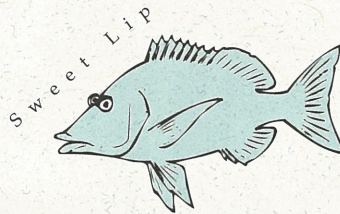
Geoff Shannon demonstrates the latest animal husbandry techniques for rearing baby seahorses. Photo: Glenn Shield

Kids Corner



Hi Kids! I guess by now, you have all seen our new Fisheries exhibit. I liked it so much, that I have a Fisheries board game for you to play with your friends. I hope that you have fun and learn from playing the game. See you soon in the Aquarium. Bye for now.

Sidney



Mangroves removed.
Miss 2 turns while you search for more mangroves.

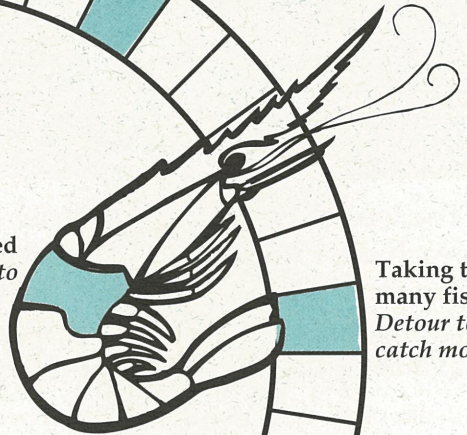
Keeping to bag limit.
Have another turn.

Barramundi



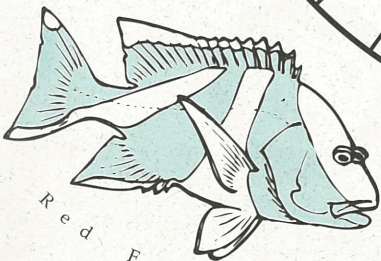
Fishing in closed season. Return to start.

Agricultural run-off killed reef. Go back 6 stops to find another reef.



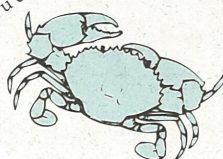
Taking too many fish. Detour to catch more.

Taking male crabs of legal size. Throw again.



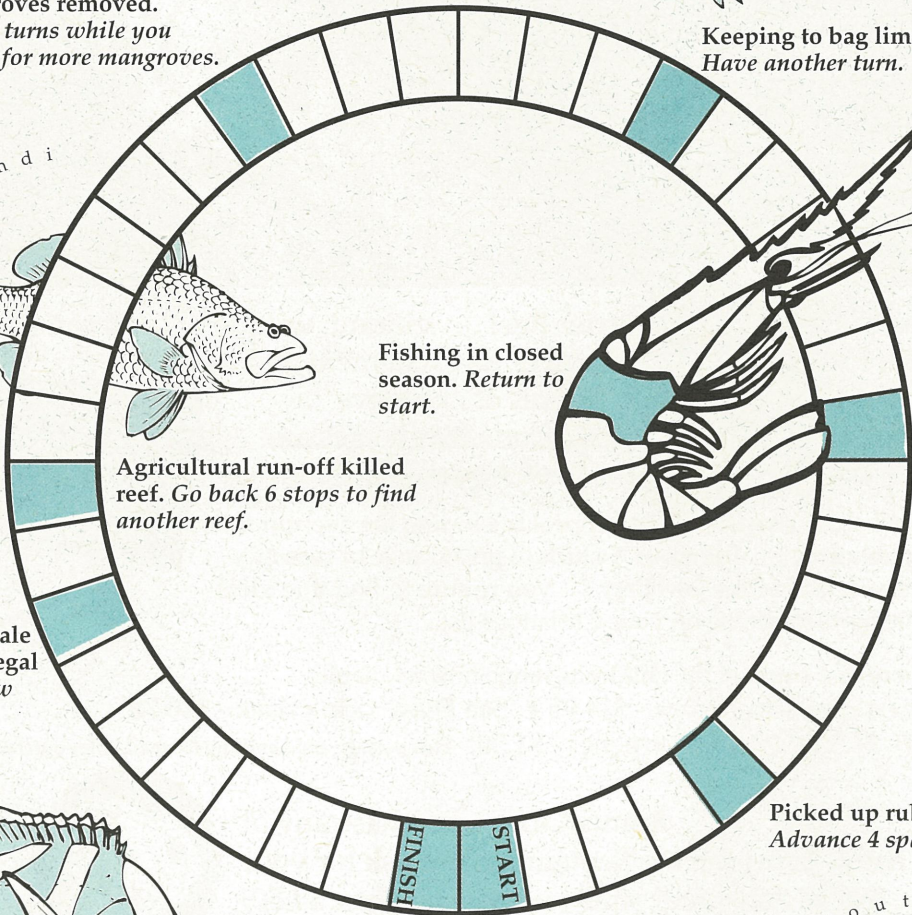
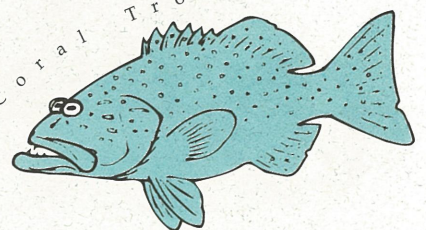
Red Emperor

Mud Crab

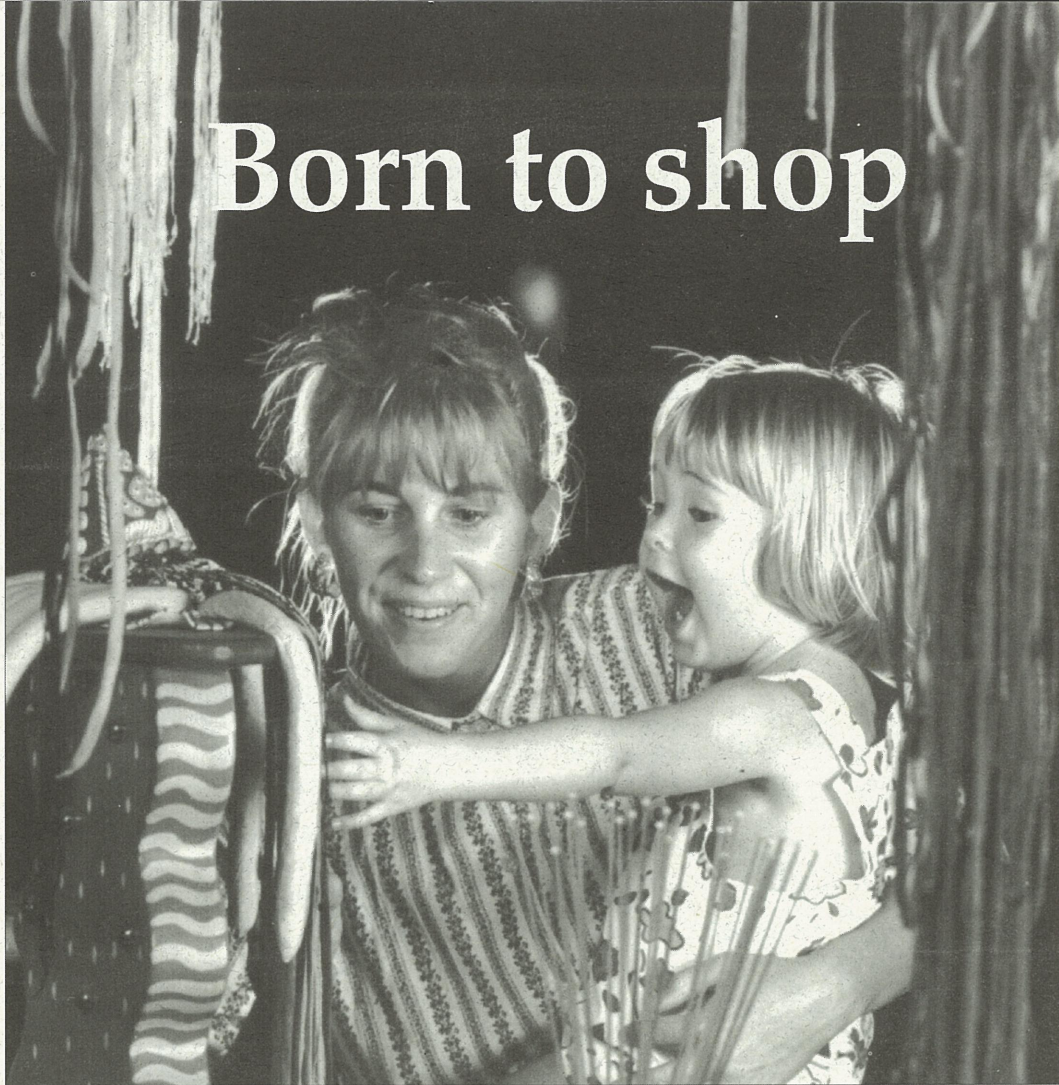


Picked up rubbish. Advance 4 spaces.

Coral Trout



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