

# OZDIVER

AUSTRALIA'S PREMIER DIVE MAGAZINE

**BANDA  
ISLANDS**

**BIOROCK**

**LUST  
FOR  
RUST**  
PART I

**RISK WITH  
OXYGEN**

**HOME  
IN THE  
SAND**

**LEGENDARY  
PALAU**











It is time to start looking for some warmer clothes and dive gear where I live. Yes, on my side of the country winter is arriving. In front of my office I can see the trees are dropping their leaves, which is normally a sign that I must start looking for my dry suit. Most divers around the world do not like it when winter arrives and they normally stop diving. I have never stoped diving, never, just maybe taken it a little bit slower. For me winter is normally a time when I dive for myself and do not teach any courses so I can spend more time with my family. I still have to get use to the winter rain because for most of my life winter was dry and cold and now it is wet and cold underwater and on the land as well. Our flights are booked and the team are working really hard on everything to get ready for the

Dive Expo in Sydney 12 - 13 September (AIDE 2015). We will have a stand there and the show have asked me if I want to do a talk on finding a living Dinosaur. Most people think that Coelacanths were extinct for many years. But a few divers started to look for them and found them deeper than 100 meters, it changes the history books. I was part of the Coelacanth expeditions for eight years and swam with this living Dinosaur in its natural habitat. I hope to see some of you there. I have to say that our OZDiver magazine Apple App is running very well and we are happy as the Android App is on its way and will be here very soon. Download it and see if you like it. And finally, after a year of hard work it is here. My book, The Dive Spots of Western Australia is an indispensable guide for all level of divers and snorkelers, broadening their horizons on places to visit and dive/snorkel in Western Australia. The book lists more than 175 dive spots in Western Australia. It includes important guidelines on each coastal dive destination include accommodation, facilities, travelling tips and dive conditions. It is complete with photographs and more than 100 illustrated maps of each dive site. All reefs are star rated and covers depths, marine life and other essential information for the diving and snorkelling community. I hope that you enjoy this winter edition of OZDiver and if you have ant interesting articles or stories please contact me.

The Editor & Publisher

Johan Boshoff

-it is all about the journey and not the destination

#### Genesis 1

1 In the beginning God created the heaven and the earth. 2 And the earth was without form, and void; and darkness was upon the face of the deep. And the Spirit of God moved upon the face of the waters.

# OZDIVER

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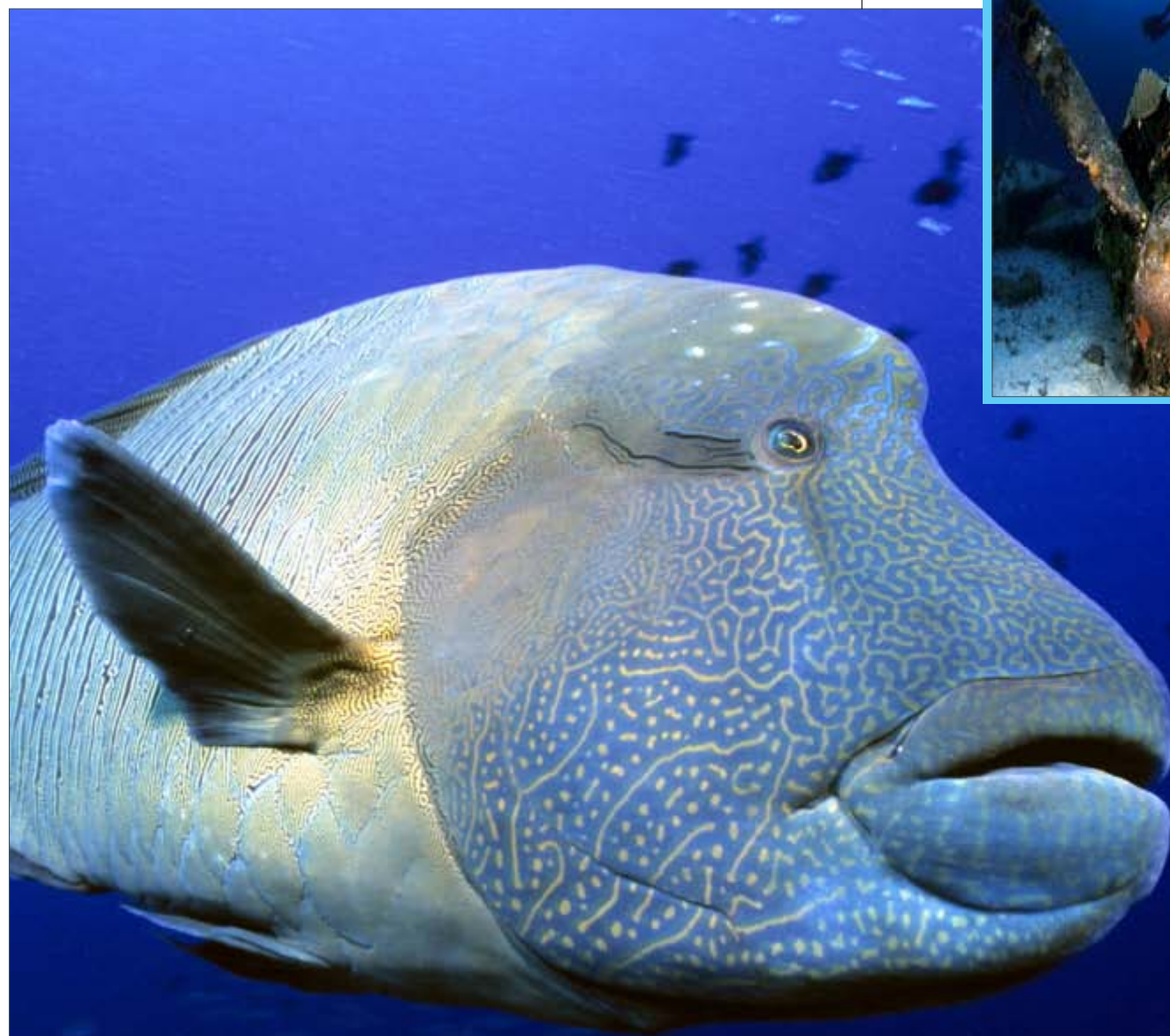
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**COVER PHOTO**  
Peter Pinnock  
www.peterpinnock.com



Peter Pinnock

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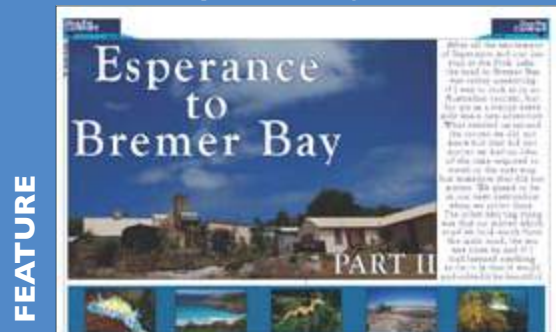
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### Old divers never die.

#### Halfway through our dive, we realised that one diver was missing...

Hennie is an old diver. He learnt to dive before Jacques Cousteau. Well, not quite, but certainly before BCDs and regulators were invented. That is like pre-history to most divers. Hennie still owns, and sometimes uses his first dog-collar BCD. He taught many of the diving personalities of today how to dive. He has all the dive qualifications in the book except cave diving (he says he hates dark holes). He was the founding member of one of the biggest dive clubs in the country. Legend has it that Hennie has logged over 2000 dives. Despite his vast knowledge and experience Hennie is one of the most modest and unassuming divers around. He never boasts about his record. He will never try to show another diver up when a controversial topic is discussed. He never sports

any of his vast array of achievement badges. Any diver meeting him for the first time would think he is just 'one of us'. I have been on many a dive with Hennie and when the dive master asks him what his qualifications are, his standard reply is, 'open-water one'. He would rather enjoy the dive with us than be appointed DM for the day.

Hennie and his wife own a gorgeous cottage on the beach at Umzumbe near Port Shepstone. Everyone in our dive club is anxious to join them when they go down to the cottage for a diving weekend on Aliwal Shoal. These weekends are notorious for all the partying that takes place. I was fortunate enough to be one of those invited for a long weekend. The cottage can accommodate only eight people, but as usual 26 arrived. Some slept on the veranda, others in the garage, and the rest camped under the huge fig tree in the garden. Amongst us 'Vaalies' there is always additional excitement when we arrive at the sea and the party on the first night is usually the most hectic. This weekend was no exception.



The party started as we arrived on Friday afternoon. Fires were lit and out came the beers and braai. The topic of conversation was, as usual, diving.

Besides being a superb diver, Hennie is an excellent host. He makes sure that everyone's glasses (including his own) are always full. The party carried on until the early hours and Hennie was the last to go to bed. After too little sleep, Hennie woke us with coffee and rusks at 6am and off we went to the shoal. Most of us had never dived it before so our adrenalin was pumping at the prospect of diving four kilometres out to sea. During the pre-dive briefing, Hennie listened to the instructions with the rest of us, although he has heard them hundreds of times before. He helped us kit up, and by 7am we were on the boat and on our way. Hennie was not his usual talkative self, admitting that he had had only three hours sleep.

The dive was one of those perfect shoal dives with vis of 18 metres and fish everywhere. Halfway through the dive the DM did a routine check and we discovered that someone was missing. When we checked our buddies, we realised that it was Hennie. His wife, who was busy taking photos, had not noticed that he was not behind her. He usually looked after us, not the other way around. The DM instructed us to swim back the way we had come to look for Hennie. About 50 metres back we saw bubbles and in a little gully on a clear patch of sand we found Hennie lying face down on the sand. We thought he was dead, but a closer look revealed he was only fast asleep.

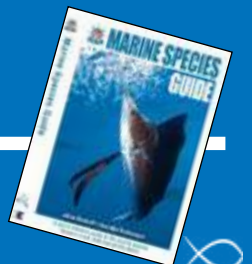
#### Lessons to be learnt

- Drinking and partying before a dive can be extremely dangerous
- Stick with your buddy, even if you are busy taking photos



## WIN Send your letter to us and win a Marine Life Species Guide

Here is a chance to be heard! If you have anything that you would like to share with OZDiver Magazine and other divers, send an email to Log Book at [johan@ozdiver.com.au](mailto:johan@ozdiver.com.au). Remember that letters have more impact when they are short and sweet. We have the right to edit and shorten letters. In every issue, the winning letter will receive a Marine Life Species Guide.



### Hooked on diving and OZDiver Magazine

Thanks for a great magazine that has opened a whole new world up to me. I picked up the magazine one day in a waiting room and was hooked – I am in the process of qualifying to dive and can't wait to go to dive again and see for myself what I have only seen in your magazine. This is my short and sweet way of saying thank you.

Magriet





# OZ News



## Australia International Dive Expo (AIDE) 2015

12 - 13 SEPTEMBER 2015 - SYDNEY

The first ever Australia International Dive Expo debuted at the Royal Hall of Industries in Moore Park, Sydney on 22-23 February 2014. It was successfully concluded with dive enthusiasts attending from eight different countries including Australia.

The show was a great stepping-stone for the consumer market interested in recreational diving. At the Expo, exhibitors introduced new dive gear, dive destinations, tours and camera products to the visitors.

AIDE is back for 2nd year with exciting exhibition and activities for keen divers and to be divers. Scheduled for 12 - 13 September 2015 at Royal Hall of Industries, Moore Park, Sydney, the show will continue to promote the sport of scuba diving, snorkeling, free diving, dive equipment and gears and dive travel as well as ongoing conservation efforts and practices.

Approximately 5,000 visitors anticipated and a total of over 100 booths to be taken at the expo with floor space of 5,000 sqm. Sessions for presentation will be allocated on first come first serve basis.

AIDE 2015 will see even more experts from the diving community taking the stage to share their knowledge, vast experience, travel advice and valuable diving tips. Product demonstrations will also be held at the event for those interested in learning about the latest marine gadgets and diving technology.

A trade session will be included as parts of AIDE 2015 to better engage with industry suppliers and partners. The expo will be one stop center to promote and showcase your product and services.

Also, not to be missed is the Underwater Project, the world's first perpetual underwater shootout. Visitors are encouraged to join this project and be part of the exciting shootout competition at [www.underwaterproject.org](http://www.underwaterproject.org).

AIDE2015 is open for registration with the early bird package ending on 28 February 2015.

Information on Speakers, Activities and all details for the show will be updated from time to time. Kindly visit AIDE's website at [www.austriadiaveexpo.com](http://www.austriadiaveexpo.com) and join our Facebook page to get the latest news.

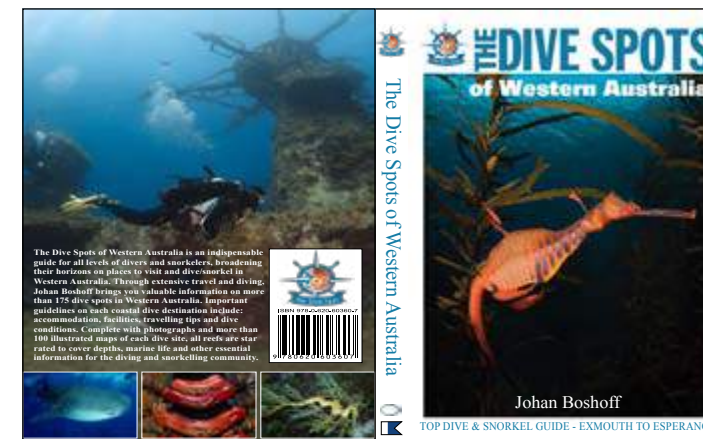
**AUSTRALIA  
INTERNATIONAL  
DIVE EXPO**

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**AIDE 2015  
DIVE & DISCOVER**

## NEW Book - Dive Spots of Western Australia

The Dive Spots of Western Australia is an indispensable guide for all levels of divers and snorkelers, broadening their horizons on places to visit and dive/snorkel in Western Australia. Through extensive travel and diving, Johan Boshoff brings you valuable information on more than 175 dive spots in Western Australia. Important guidelines on each coastal dive destination include: accommodation, facilities, travelling tips and dive conditions. Complete with photographs and more than 100 illustrated maps of each dive site, all reefs are star rated to cover depths, marine life and other essential information for the diving and snorkelling community. For more information visit [www.thedivespot.com.au](http://www.thedivespot.com.au)



## OZTeK 2015 Australian Diving Technologies Conference & Exhibition

As a speaker-based event incorporating a full-scale dive exhibition, the OZTeK Diving Technologies Conference and Exhibition remains a clearly targeted event directed towards an affluent and influential audience of diving consumers and industry decision makers.



Although attracting seemingly smaller audience numbers than is usually reported by many other Dive Exhibitions held around the region, the busy schedule of speaker presentations, seminars and workshop sessions appeal to people who are passionate about diving: a core feature of the OZTeK format and one that ensures greater visitor retention and the creation of increased sales opportunities for those exhibitors who place a value on audience quality rather than quantity.





Playing a key role in the global promotion and advancement of diving, OZTeK has - with the staging of the ninth event since its inception in 1999 - firmly established its position as an event without equal. Steadily growing in international stature, it is now considered to be one of the premier - and best regarded - diving events of its type held anywhere in the world. This, in no small part, is due to the event's knowledge-based format.

While still retaining its accent on emerging diving technologies and techniques, OZTeK2015 continued to broaden the event's appeal among the entire diving community - regardless of experience or qualification levels - by inviting them to consider all of diving's exciting possibilities. Encouraging an appreciation of the benefits advanced technical training programs and equipment upgrades offer, OZTeK remains focussed on diver retention and the creation of a new generation of technical divers keen to learn more; an enthusiastic audience who, in turn, will transmit their passion for diving to others.

#### AUDIENCE

The OZTeK2015 attendance was up by 10%, with the largest increase seen amongst the general diver visitors, as well as committed experienced divers. Consisting of Exhibitors, Speakers, Conference Delegates, and Visitors to the exhibition component of the event. Attendance numbers were - conservatively 2,319

#### SPEAKERS

As a conference-based event dedicated to the full spectrum of underwater activities, and achievements, OZTeK2015's aim was to appeal to as broad a spread of diving interests as possible. With that goal in mind, we approached, and received the support of, some of the world's pre-eminent authorities in their respective fields of diving expertise.

At any one time during the course of the two-day symposium, there were up to four conference sessions/workshops running simultaneously. As far as was possible, we attempted to stream the presentations so people with specific diving interests, (i.e. wreck diving, cave diving, physiology, etc.) were able to concentrate on those speakers and topics of particular appeal.

#### EXHIBITORS

Based on the progressive growth of OZTeK, the floor plan was increased and designed around a maximum of 76 display booths with, in order to accommodate as broad a spread of exhibitors as possible, stands being restricted in terms of their maximum size.

In many instances - and aware of space constraints in terms of



the venue's ability to accommodate more stands in the main ground-floor area - compatible companies and organizations shared stands and are not necessarily reflected in the following exhibitor list.

#### OZTEK2015 UNDERWATER IMAGERY COMPETITION

Now an international competition in its sixth event, the OZTeK2015 Underwater Imagery Competition welcomed entries from divers with an imagination, a camera and a willingness to share their discoveries and experiences with others.

Co-ordinated by Jayne Jenkins and judged by a panel of experienced and accomplished underwater photographers, the entry categories were:

- Wreck - Any image taken that includes an image of a wreck, or part thereof
- Cave - Any image taken that includes an image of the inside of a cave or cavern
- Marine Images with Diver - Any underwater image featuring a diver as the model.
- Marine Life - Any image featuring marine life. Must not include diver in the shot.
- Macro Marine Life - Subjects that require use of a macro lens or macro setting to capture image.

The winning entries were mounted by Bluefish Photo and hung in the Heritage area along with a new Underwater Photographic Exhibition.

All the competition entries are now up on the website Photo Gallery <http://oztek.com.au/The-Image-Gallery-2015>

#### THE GALA AWARDS DINNER

Based on the progressive growth of OZTeK, the floor plan was increased and designed around a maximum of 76 display booths with, in order to accommodate as broad a spread of exhibitors as possible, stands being restricted in terms of their maximum size.

Unique among diving events in that its knowledge-based format actively promotes the adventure and excitement inherent in all aspects of the activity, OZTeK encourages industry growth by focussing on diver retention.

Delivering a clearly qualified audience of people who are passionate about diving - OZTeK will continue to evolve as a leading forum for enthusiastic divers keen to take their training to the next level and who seek greater knowledge and a better understanding of all that the world of diving has to offer.

By: Sue Crowe



#### Dive Schools / Operators / Organisers / Instructors

Do you have any interesting, newsworthy info to share with the industry? If so, we would like to invite you to send us your OZ News section for possible inclusion in the magazine (please note that inclusion is FREE of charge).

Here's what we need:

- Newsworthy stories (promotional material will not be accepted)
- Word limit: 100 words
- Text prepared in a Word document
- Accompanying high-resolution image(s) are welcome (please supply caption and image credit)

Please send to [info@ozdiver.com.au](mailto:info@ozdiver.com.au)



# AUSTRALIA INTERNATIONAL DIVE EXPO (AIDE) 2015

**AUSTRALIA  
INTERNATIONAL  
DIVE EXPO**

**AIDE 2015**  
DIVE & DISCOVER

**ROYAL HALL OF INDUSTRIES  
MOORE PARK, SYDNEY  
12 - 13 SEPTEMBER 2015**

**JOIN US ON BUSINESS FOR DIVING AT AIDE 2015**

**SEMINAR FOR AGENCY  
SEMINAR ON PRODUCT KNOWLEDGE**

**TALK/PRESENTATION AT MAIN STAGE  
POOL TRY-DIVE FOR NON DIVERS**

**HOLIDAY PRIZES TO BE WON  
KIDS' ACTIVITIES**

**B2B MEETING FOR TRADE  
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Photo: "Blinded By The Light" By Matthew Shepherd  
Picture Courtesy : Underwater Festival™



# Esperance to Bremer Bay

## PART II

After all the excitement of Esperance and our last stop at the Pink Lake, the road to Bremer Bay was rather unexciting if I was to look at in an Australian context, but for me as a visitor every mile was a new adventure. What awaited us around the corner we did not know but that did not matter we had no idea of the time required to travel to the next stop but somehow that did not matter. We aimed to be at our next destination when we arrive there. The other exciting thing was that no matter which road we took south from the main road, the sea was close by and if I had learned anything so far it is that it would undoubtedly be beautiful.

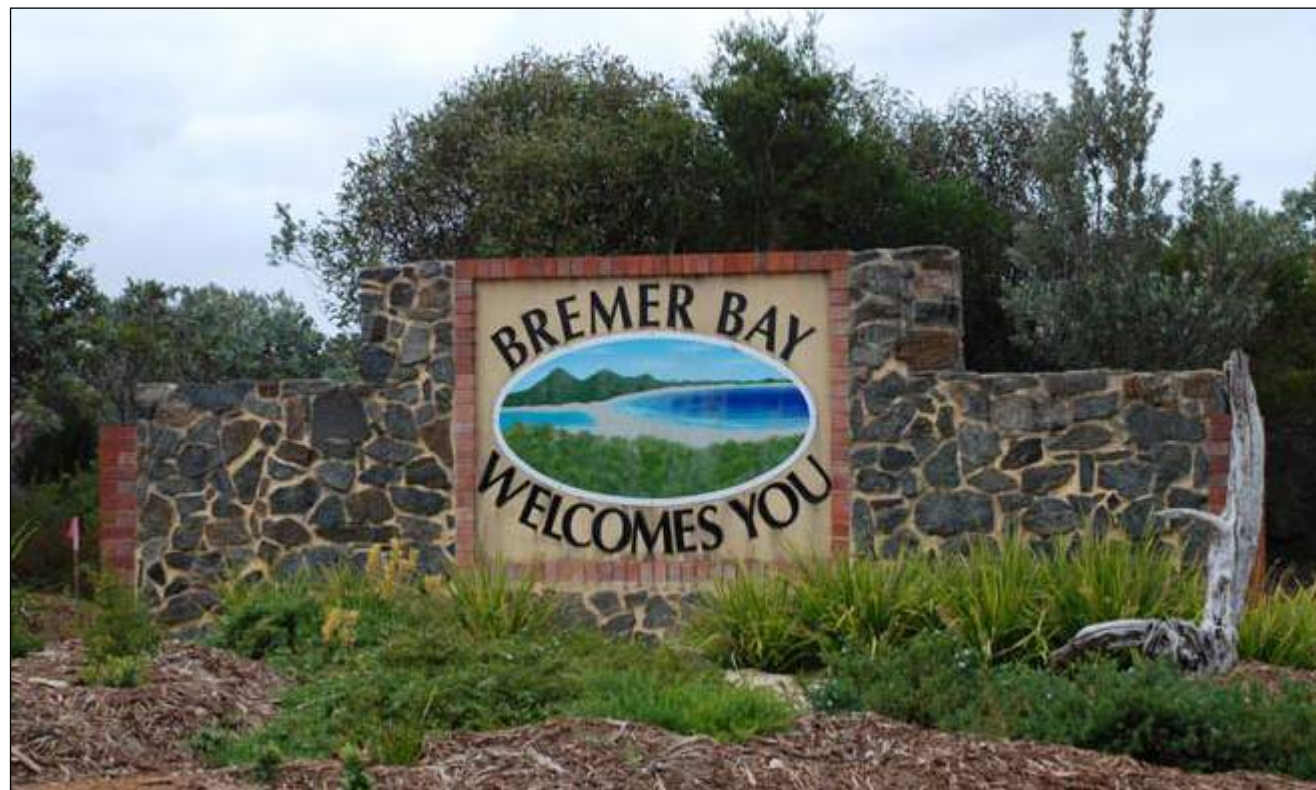






After all the excitement of Esperance and our last stop, the Pink Lake, the road to Bremer Bay was rather unexciting if I was to look at in an Australian context, but for me as a visitor every mile was a new adventure. What awaited us around the corner we did not know but that did not matter we had no idea of the time required to travel to the next stop but somehow that did not matter either. We aimed to be at our next destination when we arrive there. The other exciting thing was that no matter which road we took south from the main road, the sea was close by and if I had learned anything so far it is that it would undoubtedly be beautiful. We were, however, not interested in getting side tracked from our main objective. Bremer Bay would be our next

stop and this place promised, if our information were to be true, to entertain and delight. By all accounts this would be the place where we were most likely to see Seadragons, which we both had wanted to see in their natural habitat for many years. We followed the main route No 1 from Esperance and skirted past the Fitzgerald River National Park, which falls within the Shire of Ravensthorpe and the Shire of Jerramungup. The park also includes the Barren Mountains and Eyre Range as well as the Fitzgerald River. The park is spread over 329,882 hectares and has over 1800 species of plants of which 250 are rare species and 62 are only found in the park. The park is not only known for its flora but also its fauna. It is home to 22 species of mammal, 200 bird species, 41 species of reptile and 12 species of frog. Very rare bird species have been recorded here, such as the Western Bristlebird, Western Ground Parrot and the Western Whipbird and also the endangered Malleefowl. This is an ideal place for people with a keen interest in bird watching and other outdoor pursuits. Bremer Bay forms part of the western access to the park and lies 180 km east of Albany. The town has a 'small town' charm about it and is home to some 200 permanent residents. It is clear that bigger and better is yet to come: new asphalt roads are being laid down and the town seems set to expand. The



large number of tourists are helping to facilitate Bremer Bay's growth, the town receives more than 5000 visitors in summer and easter, and families have started to keep holiday homes. Roads in the Bremer Bay area were recently sealed although the smaller roads that lead to the many secluded bays are still gravel, which lends to the charm of the area. There are many bays facing different directions to choose, so you are almost sure to find a sheltered bay to visit, or to do shore dives from. You will find many unexpected sights such as hard and soft coral that would normally be found in warmer water. The dives vary in depth from 10m to 25m, which caters for all levels of diving skills.

After arriving in Bremer Bay we found the dive shop very easily. The shop is a small privately owned business owned and operated by Craig and his wife who run the shop from the front of what looks like their house. They seem very passionate about diving but the same tale, that of lower numbers of divers are also told here. This seems to have hit the industry very hard, and as is testament to this many dive operators have been forced to close their doors in WA. Craig seems optimistic though, mainly because Bremer Bay receives regular visitors from Asia, who come here for the very same reason that we made our journey to Bremer Bay: to see the Seadragons.

But for now the Seadragons had to wait until

morning as we first needed to find a place to call home for the next couple of days. Bremer Bay has many accomodation options so it did not take us long to find a nice caravan park to pitch our tents. After driving a couple of kilometres down the road we found Bremer Bay Beaches Resort and Tourist Park. The fees were really not expensive which was a bonus for us as we were on a small budget. The receptionist was very friendly and she had us on our way in short order. We asked for a camp site that was out of the way as we preferred not to stay with people to close to us. We were given a stand close to the tennis courts, the campers' kitchen and ablution facilities. The camp grounds were well kept and the clean kitchen had all the necessary appliances. The obligatory BBQ's were also in good working order and cleaned regularly. The ablution and shower facilities were also adequate for our needs. As long as I can have a warm shower when needed and I can brush my teeth without fighting the local fauna for a space by the sink, I am a happy camper.

Up until Bremer Bay the only Kangaroos I had seen were of the dead variety next to the road. I was very disappointed to see so many dead animals, mostly because I had the idea in my head that they were scarce and that I would probably not get to see a live one except for maybe in a zoo. I was however told that there are more than enough of these very





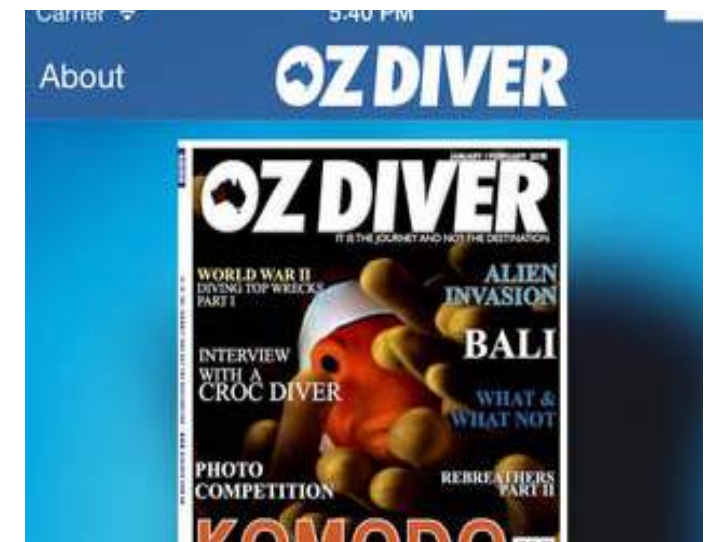
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peculiar animals around. In WA alone there are almost 2 million of them. It did not take long for me to come quite close to one of these locals grazing on the lush grass in front of the kitchen. I was actually rather excited and I called Johan to come have a look. They were quite content to have us around them although I did not dare get too close. I have heard that they use their front legs to box and their hind legs to kick and that they can cause some serious injuries, although I had comprehensive travel insurance I was certainly not going to find out for myself. They did however seem like peaceful animals, and as I have tasted some of their meat, rather tasty too. For a guy that comes from South Africa and has seen plenty of antelope and other wildlife these were indeed strange looking animals. The more I observed them the stranger they looked. The way they moved when grazing and the way they hopped was just strange to me and I am sure I could have spent hours just staring, but we were on a mission don't forget.

We set about organising our camp, I pitched my tent and Johan decided that he was going to make his home inside the van, a living arrangement that lasted for the remainder of our travels. I of course did not complain as I now had the whole tent to myself and this made for comfortable living. The next morning we packed our diving gear into the van

and started our search for the elusive Seadragon. Dragons have been part of Asian culture for thousands of years and still fascinate to this day. It is definitely the closest you will get to a creature that closely resemble the mythical creature. If you need information with regards to where to dive and look for Seadragons you will find no better source than Craig. He knows the bays and their layout like the back of his hand and he will also be glad to take you out on his small inflatable boat if you want to do some boat dives. Finding these elusive creatures also seems to be no problem as he has done enough dives to know where to start looking, and look you have to, because these creatures are so well camouflaged that it is very difficult to spot them.

The Seadragon, as the name suggests, looks similar to what mythology has taught us a dragon would look like - without the legs, large teeth and fire breathing of course. There are two species of Seadragons; the Leafy Seadragon and the Weedy Seadragon. Both of these are named after the characteristic leaf and weed like projections from their body.

The Seadragon comes from the same family as the Seahorse and Pipefish so it has the same snout-like mouth and a long slender body. They have wing-like appendages that grow from both sides of their body. Weedy Seadragons (*Phyllopteryx taeniolatus*) are usually a reddish color with yellow spots and purple-blue bars. Weedy Seadragons can grow up to 45cm in length while the Leafy Seadragon grow up to about 24cm. Leafy Seadragon (*Phycodurus eques*) are mostly green in colour and have more ornate appendages than the Weedy Seadragon, which makes them very difficult to spot especially in patches of sea leaves and other plants. Seadragons have very sensitive flotation bladders that cannot compensate for sudden changes in water pressure or depth. Seadragons are only found in southern Australian waters and nowhere else. They inhabit a wide variety of habitats including rocky reefs, sea grass meadows and seaweed beds where they can take advantage of their camouflage to protect themselves from their natural predators. The greatest danger to Seadragons are humans. They are caught by collectors who take the Seadragons for profits or as an addition to their home aquariums. The Seadragon is also a very delicate marine animal that is adversely affected by pollution, habitat damage and loss, and the discharge of industrial waste into the water.

Another factor that makes Seadragons vulnerable is due to the fact they cannot use their tails like seahorses to grab onto sea grass. The result is that they are sometimes washed ashore after storms. Fortunately both Seadragon species were declared





protected species in 1991 and concerted efforts have been made to minimise the impact of humans on their population. Government permits are needed when trading in Seadragons and only hand reared Seadragons are sold to aquariums around the world. Another very interesting fact about Seadragons is that they do not have a stomach. They live on small mysis shrimp and plankton and will also feed on larval and small fish. Because they do not have a stomach they cannot hold reserves for energy and therefore they have to eat constantly to maintain their energy, this would not leave much time for sleep I imagine.

The fact that these beautiful creatures are so elusive and difficult to spot was the main reason that I put them to the top of my list of underwater creatures to see before I die. Never had I been closer to realising that dream.

The main areas which we were informed we should start our search for Seadragons are all accessible from the shore and access to these bays is easy. The best places to search, we were told, were Little Boat Harbour and Back Beach Bommie. Alternatively we could also dive Fisheries Boat Harbour. We were also told to decide where to dive first as although the Seadragons are usually found in these bays, sightings cannot be guaranteed as they manage to blend into the surrounding perfectly; just because you did not see them does not indicate their absence. Our mission just seemed to get a little bit more difficult but we were up to the task. We decided that we would dive Little Boat Harbour. As most of the dives are beach entries this was no different than most of the dives we had done up until now. We found a spot to park the van and kitted up before walking to the waters edge. The water was nice

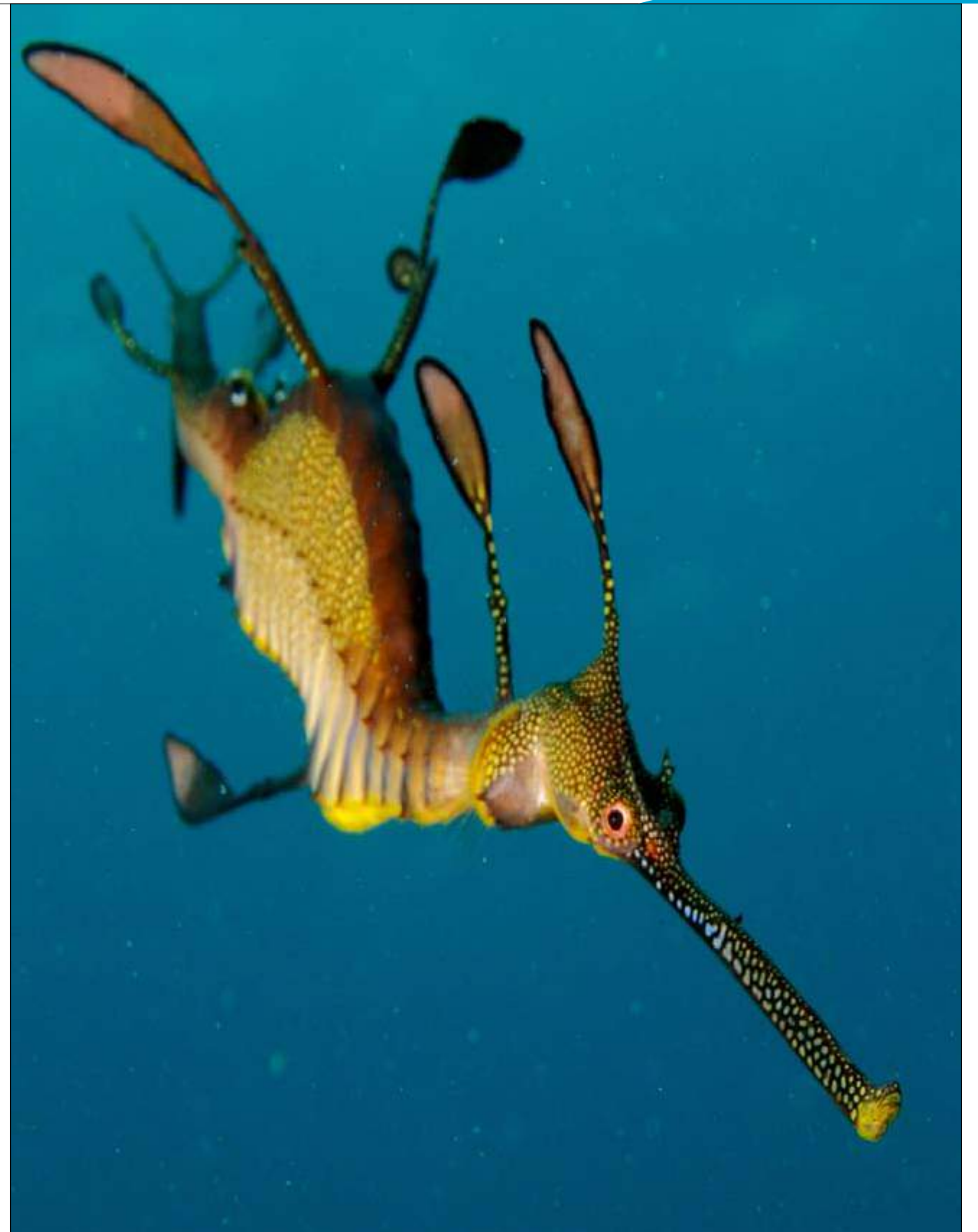


and warm and my 5mm wetsuit was more than warm enough. We swam out into the bay keeping to the left as far as possible to not get lost and to have a reference point, we set out to find the depth required to find the Seadragons. No more than 15 meters of depth was required, anything deeper and the chances of finding them would diminish. After some fining we found an area that seemed to have the right depth and the right type of sea grass, we it thought would be a great place to start looking. I had with me a little Go Pro Action camera that had a light setup attached to it while Johan had his monster SLR with powerful strobe lights attached. I switched on my lights and started to swim around; the task at hand became immediately clear to us. We have all seen pictures of Seadragons and we realised that the amount of sea grass and sea weed around us would make it almost impossible to spot any life let alone a perfectly camouflaged Seadragon. The best I could do was to shine light on every thing I thought could be a Seadragon and to fin along the ledge that we had found, which had a sandy bottom that did not extend much deeper than 10 meters. I could see that Johan also did not have much hope of us finding anything. The surge was also a problem as this moved the grass and weed about making an already difficult task an impossible one. Not being guys that just give up we continued looking around until I heard the characteristic exuberant underwater noises of a rather excited dive buddy. Not knowing what was going on Johan pointed to where I was. And there very close to me I saw my very first Seadragon, a Weedy Seadragon. I had inadvertently swum over one of these creatures and I did not even notice it. Johan saw it because his angle towards it exposed it from the grass dancing in the surge. This was all very exciting. We immediately started taking video and pictures of this little creature. It effortlessly floated through the water by making use of its modified pectoral fins located just behind its head, as well as a modified dorsal fin on its lower back. Seadragons move slowly and almost magically without any observable movement. They are very aware of their surroundings and always on the lookout for potential mates and prey. They seem to have a stately poise about them. Almost like a Saddle Horse with its head held high in a display of confidence. The camouflage with which these lovely creatures are blessed also works really well, take your eyes off it for a moment and you have look really carefully to find it again and it happened on more than one occasion where Johan had to point me in the right direction.

After a couple of minutes and many pictures later we decided to move on to try and find its cousin, the Leafy Seadragon. If finding the Weedy Seadragon










By Gerrit Maritz

was a mission it was going to be impossible to find the even better camouflaged Leafy Seadragon. This we found to be true because for the rest of the dive we did not manage any further sightings. I am sure if we were to spend a week diving all the bays we would eventually condition ourselves to spot them much easier but unfortunately we did not have a week to spend. We were both very excited following the dive and it was definitely a dive to remember. Fisheries Beach also has a dive trail that was installed in 2001 and has 14 concrete plinths on which information and pictures are placed, which indicated the most prevalent species in that specific area. This was very informative and they are easy to follow out into the bay. It was only the second time that I have dived such a trail and it is a very good idea to draw divers and to help them explore sites that would normally just be left without ever diving them.

With our mission completed we decided to do one more dive the following day. For our last dive we would go to the Fisheries Beach. The boat harbour is located within a sheltered cove that is also popular for swimming. The whole area is great for boating and fishing and also for whale watching as the waters are frequented by Southern Right Wales as they calve there from July to November each year. The harbour is a very pleasant place to spend a day in the sun with now, as usual, clean toilets and

parking space. The entry into the water could not be easier. The breakwater causes the water in the bay to be very calm and you simply walk into the water and descend to the bottom. The route we followed was all along the breakwater, out of the harbour mouth and around into the open water all the while keeping the breakwater on our right. Nice and easy. This was definitely a very easy and interesting dive. We managed to score ourselves some fishing knives and tackle that had been dropped into the bay by fishermen. We also found some cuttlefish towards the end of our dive; these are always a treat for me as I do not often get to see them and I really find them cute, but in a rugged manly way of course. This last dive brought an end to our Bremer Bay experience. What a lovely place to have visited. By now I was getting used to the turquoise seas and the white beaches. It still managed to wow me though. It would take a long time to get used to the coastal scenery and to take it for granted. Fortunately for me all was still pretty new and adventure still awaited me. I now know why the town grows every holiday season and for good reason. We had a wonderful stay but all too soon it was time to pack up our equipment and load the trailer for our next port of call. The following morning we would hit the road following the main route all the way to Albany where we were to spend a couple of days doing what we do best - exploring the country and diving. 





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# Featherstars and Sea Lilies

**Phylum:**  
Echinodermata  
(derived from  
Greek words  
echinos and  
derma, meaning  
hedgehog and  
skin)

**Class:**  
Crinoidea  
(derived from  
Greek words  
krinon and  
eidos meaning  
lily and form)

As you can gather from the names above, this phylum consists of animals with a hedgehog-type skin. These include starfish, brittle stars, sea urchins, sea cucumbers, feather stars and sea lilies, to name a few.

## THE FEATHER STAR

The feather star looks like a fern, with a symmetrical array of fronds growing in a circle, and numerous leaves growing from the stem of each frond. Despite this plant-like appearance, the feather star is an animal similar to the ordinary starfish. Each arm, with its many branches called pinnules, looks like a bird's feather.

The arms are joined to a small body, under which is one set of claws that close and hook onto rocks or marine growth. Unlike that of other starfish, the mouth of this animal is situated on top of the body and not on the underside facing the ground. Feather stars are filter feeders and eat minute food particles strained from the water. Each pinnule has a hair-lined groove running along its top. These join into a large groove running all the way along the arm into the mouth.

Food particles encountering the pinnules drop into the little grooves. The many hairs move in such a way as to pump the water down these channels. Water and food in these tributaries join the main stream down the arm, and the food is passed on to the mouth.


Some feather stars position their crown of fronds at right angles to the water current so as to entrap as much of the passing food as possible. Where the direction of the water current is not constant, the animal can have the fronds in "disarray" so as to always have some surface at maximum efficiency. Those in deep water often face upwards and catch particles as they sink to the bottom.

Because the food particles reaching the mouth are so small, and have already been broken down to such an extent, the animal does not need a big and complex digestive system. After the stomach has absorbed the nutritional pieces, the waste is expelled in little pellets from an opening near the mouth. These roll off the top surface of the body and drop to the ground.

The feather star's skeleton forms a fairly rigid frame and gives the body shape. Numerous little interlocking bones called ossicles are found in the pinnules, arms and claws. The limbs are jointed to allow some movement and elastic ligaments keep the limbs extended. Flexing the muscles expands the ligaments, causing the limbs to close inwards. Although feather stars can creep about, they seldom do. They spend their time sitting and waiting for their food to be brought to them. When they do move, they walk on their arms. If turned over, these creatures can sense that they are upside down and soon start righting themselves. They can even swim by waving their arms up and down in the water. The arms move in sequence, so they are not all at the same position at the same time.



THE SEA LILY

The sea lily closely resembles the feather star. However, you are unlikely to find one since sea lilies live in water deeper than a hundred meters. As adults they remain permanently in one place. On the underside of the body is a stalk that ends in either a disc or root-like limbs that secure the animal to the sea-bed; the stalk can be as much as a metre in length. Where they grow on the bottom, the stalk and crown of fronds really make them look like lilies of the sea. (Baby feather stars are attached to the seabed by similar stalks, but on reaching a certain size break off and assume a free-living existence.) There are numerous fossils of many different types of extinct sea lilies. They grew to gigantic sizes. In the days of prehistoric monsters they must have formed forests of great underwater trees reminiscent of palms. 





# Climate change & coral reefs

## Part II

For the last 10 000 years, our earth's thermostat has been set to an average surface temperature of 14°C, which has suited us all splendidly, allowing our species to create a truly global civilization in the last century. At the heart of our thermostat though, is CO<sub>2</sub>. Every time we turn on a light, cook a meal, drive a car, we are releasing more CO<sub>2</sub> into the atmosphere, altering our delicate thermostat.

CO<sub>2</sub> is a waste product of the fossil fuels almost every person on the planet uses for heat, transport and other energy requirements. Fossil fuels, i.e. coal, oil, and gas are all the remains of organisms that drew carbon from the atmosphere millions of years ago. When we burn wood, we release carbon that has been trapped out of circulation for maybe a few decades but, burning of fossil fuels releases carbon that has been trapped for perhaps 50 million years.



As carbon causes climate change, the more carbon-rich the fuel is, the more danger it presents to our future. Coal is particularly rich in carbon – burning one ton of coal produces almost four tons of CO<sub>2</sub>, and if that isn't bad enough, it also releases sulphur (acid rain).

The majority of our power stations are coal-fired, which use low grade sulphur-rich coal. The fuels derived from oil are less carbon-rich, and the fossil fuel with the least carbon is Methane (gas).

At the rate at which we have been burning fossil fuels, we could see a doubling of CO<sub>2</sub> in our atmosphere by the end of the century, i.e. from three parts per thousand at the beginning of the 20th century to six. This has the potential to heat our planet's surface by 3-6°C, which would have



catastrophic consequences.

What can we do? We have to limit our personal consumption of fossil fuels.

1. Save electricity wherever possible. In South Africa, virtually all our electricity is derived from coal-fired power stations. Every time we flick a switch, we are effectively burning some coal. Our current power shortages during peak times have resulted in a need to build even more coal-fired power stations.

Some painless suggestions to save electricity are:

- Replace all conventional light bulbs with energy saving bulbs. This cuts your lighting bill by 65%.
- Consider replacing your electric geyser with a solar powered geyser. Up to 40% of your household electricity bill is attributed to water heating. They are relatively cheap, the payback period is four years and thereafter, free carbon-free hot water! At the very least, insulate your geyser and turn the thermostat down to 50°C.
- Use water sparingly! Carry a big bucket of water up a hill a few times and see how much energy you use! Install a low volume shower nozzle – you'll hardly feel the difference, but will save 20% on your water and heating bill. Better still, shower with a friend (or if you are married, your spouse, of course!). And males, use the garden to relieve yourself at least once a day – such a waste of nutrients and water!
- Try to use alternate sources of energy where possible. Solar and wind-generated power is carbon free.

2. Regarding carbon emissions from oil, bear the following in mind:

- Next time you buy a car, consider a more fuel-efficient model. A large 4x4 may not be necessary!
- Form lift clubs.




- Fly less! Intercontinental flight releases massive amounts of CO<sub>2</sub>. Consider taking fewer overseas holidays and explore your own beautiful country.

3. Plant as many trees as you can. Trees are carbon sinks, i.e., they absorb and fix CO<sub>2</sub> from the atmosphere. Planting 30 trees a year can go a long way towards neutralising your personal carbon emissions. The oceans are also carbon sinks. Look after them!

4. Log onto [www.carbonfund.org](http://www.carbonfund.org) and calculate your own carbon footprint, including household, car and air travel emissions, and then, for very little cost, neutralise them. This donation goes to developing alternative energy resources, distributing low energy bulbs, etc.

5. Another important Greenhouse gas is Methane. It is 60 times more potent at trapping heat than CO<sub>2</sub> but doesn't last long in the atmosphere. Methane is produced by microbes in oxygen-less environments such as stagnant pools and bowels. So, burp and fart less often!

The main culprits are the billions of ruminants on the planet, i.e. cattle. Some countries have suggested a methane tax, payable for every head of cattle.irate farmers then formed an organisation called Fighting Against Ridiculous Taxes, FART for short!

Seriously, though, unless we all do something to reduce our carbon footprint, individually, nationally and globally, and are able to reduce carbon emissions by 70% by 2050 (i.e. double the pre-industrial revolution level) not only our coral reefs, but our whole planet will be in dire straits. Let us not, at the end of our lives, look at the horror and say, "you are my creation!" 



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- Solo
- U/W Hunter & Collector
- U/W Navigation
- U/W Photographer
- U/W Videographer
- Visual Inspection Procedures
- Wreck





# Saving sharks before it is too late



Look out into the blue or green waters of the ocean and know that whether they appear tempestuous or tranquil, a war is being perpetrated in its depths. This campaign has the dual distinction of being both one of the most one-sided conflicts ever to occur, yet it is virtually invisible to our everyday lives.

The battle I speak of is the systematic eradication of sharks from our oceans by the practices of modern day fishing. Sharks still inspire fear in most people despite almost three decades passing since Jaws first hit the theatres. On average, only five or six people die from shark attacks every year, while it is estimated that at current rates of harvest, humans are killing just over 100 million sharks per year – that's 100 000 000.

Primitive sharks first appeared hundreds of years ago, and their sinuous forms have slipped through the blue while the terrestrial environment witnessed the rise and fall of the dinosaurs and the eventual rise of humankind. Their longevity is a testament to their success as a well evolved and adapted group of organisms. They have proliferated into every marine environment available, from warm tropical lagoons, to the icy depths of the deep, and they are even found below the polar ice caps.

For millennia sharks have reigned supreme as the top predators in marine ecosystems, serving to regulate and control the entirety of the ocean's ecosystems. However, the ocean has a new supreme predator, one that is not a natural part of the marine ecosystem and, as a result, hunts

indiscriminately and unsustainably. We have become the enemy of sharks, and by default, the entire ocean. Oceans need to have sharks to maintain healthy ecosystems, yet after eons of mastery by sharks, the waves are empty.

Why do we kill sharks?

The war on sharks is primarily due to a demand for their fins, which when boiled down form a stringy, gelatinous mass that is included in a bowl of soup. The fin adds no flavour, just texture to basic chicken or pork stock, and can sell for \$100-\$150 US Dollars per bowl in Asian restaurants. Ordering and eating the soup is a status symbol – the equivalent of having a Ferrari in the driveway. I find it sad that we may effectively eliminate the top predators in the ocean simply to appease our sense of vanity.

Shark fins are so valuable that they have caught the attention of organised crime, and in illegal activity, shark fins are on a par with narcotics and gambling. The usual method for securing shark fins is every bit as brutal as a contract 'hit'. Since the fins are worth much more than the flesh, the practice of 'finning' sharks is still utilised as a way to maximise profit. The shark is landed alive, gaffed (speared with a large hook) and dragged on board a vessel. Once there, several men descend upon the fish with large knives. It takes barely half a minute to hack all the shark's fins off before they kick the still live carcass overboard. If the shark is lucky it will bleed to death quickly, but the more likely scenario is that without fins, the shark will slowly suffocate as it sinks to the

bottom. The fishermen are not concerned with the carcass because it would take up the space in their holds that could be filled with more valuable shark fins.

Shark harvesting occurs in every ocean and almost all the fins are shipped to Asian markets for sale. Even the economics of the fin trade are quite atrocious, as the fishermen who risk life and limb to get the fins make pennies, while the fins pass through several middlemen and eventually reach markets where they command small ransoms. Killing sharks is not good for the oceans, but it also turns out that it is not very good for most of the people who work to kill sharks.

There is one final ingredient to the precipitous decline of sharks, and that is their biology. Sharks are what ecologists call 'K-selective' reproducers, that means they have small numbers of well developed young that are well equipped to survive and thrive (as opposed to 'R-selective' reproducers who can have thousands or millions of eggs, of which a very small portion are able to survive). Sharks are slow growing, taking many years to reach sexual maturity and be able to reproduce. Finally, their reproductive potential increases with size (age) so that a newly mature mother can have, say two pups, a few years later she is able to have four pups and ten years after that she may have 10 pups. Fisheries usually target the largest individuals first, effectively taking the large, most reproductively viable mothers out of the population.

Sharks have evolved over time without a large amount of predation pressure and these strategies work well in a natural environment. However, when harvesting reduces a shark population it can be disastrous, as the shark population needs decades to be able to recover and bounce back to the original levels. Sharks are being over-harvested and the fishing pressure has not lessened. A study conducted a few years ago based on catch data acquired from fisheries has shown on average a 73% decline in shark populations in the last 100 years. Sharks are truly on the brink, and without help will be pushed right over the edge and into extinction.

The solution

To effectively defend sharks from slaughter, their biology and behaviour need to be known and incorporated into any conservation plan. This is a bit of a stumbling block, as our knowledge of them is highly incomplete, with even basic life history parameters remaining blank spaces on a fact sheet. Right now, more initiative, effort and funding needs to be devoted to the study of sharks and their roles in the marine ecosystem. If we can truly comprehend the processes occurring in the oceans, then we can set a baseline to measure the extents of the effects of the deletion of sharks from the oceans.

Many groups are already working towards this goal, including The Shark Research Institute (SRI – [www.sharks.org](http://www.sharks.org)) based in the United

States. SRI has started a multinational study of several shark species to help fill in the gaps. Biologists use direct observation, tagging and telemetry to determine shark population size, structure and movement patterns. Additionally, SRI played a part in a major shark conservation victory – the placement of Whale and Basking sharks on Appendix II of the CITES (Convention on International Trade of Endangered Species) treaty. SRI attempts to get people involved in shark conservation by running shark expeditions to several locations across the globe.

Participants can help a shark researcher to gather data and be truly involved in the process of saving sharks. The average diver can help researchers in new and exciting ways. A great example is the online database dedicated to archiving Whale shark identification based on their spot patterns (which are as unique as human fingerprints). Now any diver with a camera can help research efforts by taking a photograph of the side of a Whale shark and uploading it to Ecocean at [www.ecocean.com](http://www.ecocean.com). As a reward for uploading a Whale shark picture, Ecocean keep you up to date on the status of your Whale shark via email. Once the image is spot mapped and added to the database you will be informed whether you have sighted a shark already in the database or added a new individual. Thereafter, if there are additional sightings of the same Whale shark, you will again be notified by email of the date and location of 'your' Whale shark.

There are many further ways to contribute to saving sharks. The most important way is to boycott shark fin soup and restaurants that serve it. Putting pressure on those restaurants to remove the soup from the menu can be successful. Due to a multitude of voices on an anti-soup petition, Disneyland Hong Kong subsequently removed shark fin soup from its offerings. Public outcry has also eliminated the sale of shark fins through the popular auction website, Ebay. Nevertheless, these victories must only be seen as a start. Endangered species status and legislative protection of sharks must continue to be championed. Funding for scientific research is becoming harder to secure and private donations keep many projects alive.

Simply changing public perceptions of sharks could pay massive conservation dividends. The negative media image of the shark as a bloodthirsty killer needs to be buried once and for all and replaced with a more enlightened view as an elegant expression of evolution distilled into a graceful package of power and purpose. Stopping the war on sharks will not be easy, but armed with additional knowledge and public support it can be accomplished. The contingent to champion sharks is relatively small, but zealous and determined by the importance of their cause. The word is getting out and the support for sharks is growing, but we are in a race against time, and time is running short. ■





On a boat at sea, conflicting sensory information from the skin pressure sensors, the eyes and the vestibular (balance) apparatus in the inner ears reaches the brain and this causes motion sickness. In most people, the brain does adapt after some days of ongoing exposure, or after regular episodes of shorter exposure.

#### Symptoms:

- The diver becomes apprehensive, pale and restless.
- Odours such as petrol, diesel and fresh fish become very intense and nauseating.
- Fine beads of perspiration appear on the upper lip and forehead.
- Saliva production increases, accompanied by exaggerated swallowing and yawning.
- If the boat is big enough the diver tries to find a place to be alone but going to the stuffy confines below deck just makes things worse as does any proximity to the heat from the engines.
- Nausea and then vomiting occur. This may be short-lived with a rapid recovery from seasickness, or intensify to the point of dehydration and collapse requiring medical attention, intravenous fluids and electrolyte replacement.

#### Predisposing factors to seasickness

1. Alcohol is an extremely potent factor.
2. Food overindulgence

3. Age - young divers are more susceptible to seasickness.

4. Sex - seasickness is commoner in women, probably because women expose themselves less to interests that require deep sea exposure, such as fishing.

5. Position in the boat - the bows and stern of a large boat are the areas that have maximum movement with pitching and yawing, pivoting around the central, relatively motionless, middle of the boat.

6. Psychological factors - fear of becoming sick is very relevant as is watching other sick divers.

#### Prevention of seasickness

1. Avoid alcohol the night before diving
2. Eat lightly before the dive to avoid a low blood sugar.
3. Ensure that your gear is placed in an orderly and logical fashion next to you. Tog up quickly and get into the water.
4. Concentrate on a steady bearing such as the horizon.
5. Anti-seasickness medications

A maximum depth of 30 metres of seawater (msw) must not be exceeded if any anti-seasickness medication is taken because of the possible shallower onset of nitrogen narcosis.

#### Medications

There are a number of treatments available and the

choice depends on the severity of seasickness, side-effects, drug sensitivity and the duration of exposure to the sea.

a. Traditional and homeopathic

Many divers swear by magnetic wristbands, ginger etc.

b. Scopolamine Patches

These are intended for severe sea conditions, sea trips longer than three days and are usually applied to the delicate skin behind the ear to facilitate absorption 3 to 6 hours before diving. Side-effects include hallucinations, in-coordination, palpitations, urinary retention, skin flushing, dry mouth and blurred vision. Divers should always consult their doctor before using them. Patches are replaced every three days.

c. Cyclizine

This drug is available without prescription and assists in preventing mild seasickness. The dose is 50 mg four-hourly.

d. Metoclopramide

Available on prescription, metaclopramide is useful with mild seasickness. The dose is 10 mg three times a day. It may be used together with cyclizine if required.

e. Cinnarizine and domperidone

A combination of cinnarizine 25 to 75 mg (depending on body mass) and domperidone 10 mg is useful in assisting all but severe seasickness. The two tablets are taken together at six-hourly intervals. Drowsiness is a common side effect and could bar its use in sensitive divers.

f. Dimenhydramine

This assists severe sickness but it is highly sedating in many people. It could be used for weekend shallow diving but must be tested beforehand to exclude sedative effects. The dose is 50 mg every 6 hours.

g. Promethazine

This has been used for many years in the management of motion sickness. Again, sedation, blurred vision, dry mouth, tight chest and many other side effects have been reported. The dose is 25 mg 1-2 hours before diving and repeated 8-hourly if required.

h. Phenytoin

Marketed as Epanutin, it is steadily gaining acceptance as the most potent anti-seasickness preparation. Sedation is uncommon. The dose is 5 mg of phenytoin per kilogram body weight beginning one or two nights before diving (depending on seasickness severity), and taken as a single evening or a divided twice a day dose and repeated each day during the diving holiday.

It must be clearly understood that, to date, phenytoin has not been officially registered as an anti-seasickness, anti-air-sickness or anti-motion-sickness preparation. Phenytoin must not be taken by people with porphyria, very slow pulse rates, heart problems, low blood pressure, during pregnancy, or while taking any other form of medication whatsoever, without checking with a doctor, as drug interactions may occur. It is absolutely essential that you talk to your doctor first, as a prescription is required.





# Global News

## Former SeaWorld Trainer Reveals Mistreatment of Killer Whales

SeaWorld's reputation is about to sustain another blow with the publication on Tuesday of a scathing new book that alleges the company is little more than a cultish, soulless, money-hungry corporation. The author of *Beneath the Surface*, John Hargrove, writes from a position of authority. He was an orca trainer for 14 years at SeaWorld parks in California and Texas, and at Marineland in Antibes, France. Hargrove—along with co-author Howard Chua-Eoan—recounts in vivid detail the physical and emotional torment endured not only by captive killer whales but also some of the trainers who cared for the animals.



The narrative follows Hargrove through his career from starry-eyed young apprentice, to top-level orca trainer, to disillusioned critic who quit the company and became a prominent figure in the anti-SeaWorld documentary *Blackfish*.

Hargrove's accounts are depressing: orca calves ripped from their mothers' sides, food deprivation to ensure desired behaviors, broken teeth drilled hollow and hosed with water, whales that fight each other—sometimes to the death.

As a trainer, Hargrove, whose eyes were routinely burned by chlorinated water, was injured a number of times, leading to a painkiller addiction that was difficult to kick and permanent damage to his knees, neck, and back.

"SeaWorld has no soul", Hargrove said in an interview. "They don't give a damn about those animals; they're a commodity worth lots of money, and they have to protect their investment".

So why did he stay so long?

"I was a 100 percent loyalist", he said. "I would've done anything for that company. For many years, I took what they said as gospel, and I stayed because I loved those whales and wanted a better life for them".

"I truly feel like I was in a cult", Hargrove added. "Everything that was said to us, and the fear combined with the guilt of leaving, keeps you longer than you would normally stay. And then the vicious attacks you come under when you do speak out—it's all similar to a cult".

SeaWorld did not respond to a request for comment.

Hargrove says he was indoctrinated into a corporate culture determined to present a happy face. Trainers were instructed to call the tanks "pools" and captivity "human care". They told park visitors that 23 percent of wild orcas have collapsed dorsal fins, though the actual figure is about 1 percent, compared with 100 percent of captive adult males.

Hargrove was especially shaken by the deaths of two orca trainers: Alexis Martinez, who was killed by an orca in the Canary Islands in December 2009, and his friend Dawn Brancheau, who was killed two months later in Orlando.

Gradually, Hargrove realized he had to go.

"There came a time when I knew all was not right, and I started thinking I can change the worst parts of these things", he said. "But then I came to terms that, no matter at what level you are, how vocal you are, or how much pull you have, you can't change it".

Hargrove quit in August 2012.

SeaWorld threatened to sue him and to seek an injunction against his publisher, Palgrave MacMillan, but backed off, Hargrove said. Trainers send him hate mail, and one threatened to fistfight him at the California capitol building last April, when Hargrove testified in favor of a bill to ban orca captivity in that state.

But some trainers quietly support Hargrove.

"SeaWorld would love to control everyone's mind, which again is very cultish, but several trainers secretly cheer me on", he said. "They have to keep it secret. People are afraid to whisper my name because of the retribution". Many trainers read his book, he added, and went to see *Blackfish* "in disguise".

Hargrove, meanwhile, has a message for young people contemplating an orca-trainer career.

"I understand why they want to do that; that was me", he said. "But I would just say please look at the resources out there—at *Death at SeaWorld*, *Blackfish*, and my book—and understand the price these animals pay for being in captivity. If you really love them, you're not going to want them to suffer".

This summer, Hargrove plans to visit Washington state to see wild orcas for the first time. Friends say it will thrill him, but the ex-trainer is not sure.

"I think I'm going to be heartbroken that I lived with these whales I loved, and this was taken from them for greed and exploitation", he said. "I think I'm going to be pretty torn up about that". ■

## A federal lawsuit has been filed against SeaWorld

A federal lawsuit has been filed against SeaWorld alleging the company to have deliberately deceived customers about the treatment and condition of its captive orcas.

The lawsuit was filed in California on Wednesday by Hagens Berman Sobol Shapiro, a law firm which specialises in class-action cases.

The named plaintiff is Holly Hall, a woman from Temecula, California, who took her two grandchildren and daughter to SeaWorld San Diego in 2011 and 2012. According to the complaint, Hall would not have bought tickets to the theme park had SeaWorld disclosed facts about the condition and behaviour of its captive whales.

The complaint lists 'psychoactive drugging, forced separation of calves from mothers, forced and unnatural breeding, and cramped conditions' as factors that lead to aggressive behaviour and disease in the orca whales, adding that SeaWorld had also hidden dangers to orca trainers. SeaWorld defended its practices once again, saying there was 'no higher priority for SeaWorld than the health and well-being of its animals'.


The company called the lawsuit a publicity stunt aiming to promote last week's book release of *Beneath The Surface - Killer Whales*, *Seaworld*, and *The Truth Beyond Blackfish*, by former SeaWorld orca trainer John Hargrove. ■





# Link to Atlantis?

Compared to the creatures of the sea, the human body is somewhat inefficient underwater. With our gangly limbs and lack of fins or tails, it takes us a bit more effort to glide through the ocean. Designer Guillaume Binard has partnered with Aqua Lung to create Oceanwings, a wetsuit with neoprene membranes stretching from the arms to legs that give the wearer a sense of flying through the briny deep. Similar to the skydiving wingsuits, the smooth and slow flight experience is meant to morph our bipedal figures to be able to explore realms that would otherwise be difficult or impossible to experience.

Gliding through the water like a manta ray, Binard unveiled his prototype and video demonstration with wearer Pierre Frolla for the Aqua Lung Ocean Wings at the Paris Dive Show in January. “This project shows the similarities between the air & water environments finding their main difference with density. Then a smooth and slow flight express how powerful are the emotions & feelings that the underwater world generates on human being,” says Binard of his suit. Allowing free divers to soar through the water, albeit at a much slower pace than their aerial counterparts, Binard hopes to find a novel way to experience the wonders of the ocean. There is still no word as whether he plans on developing the suit for production. 



Sources:  
<http://portuguese-american-journal.com/terceira-subaquatic-pyramidal-shaped-structure-found-azores/>

# Ocean Wings: Aqua Lung Wetsuit Lets You Fly Underwater

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by Morgana Matus, 

# Longest Scuba Dive Attempt Scheduled For December 2015

Divers have made several attempts in recent years, both successful and unsuccessful, to break the record for the longest duration dive underwater. In September 2014, Allen Sherrod spent 51 hours and 4 minutes underwater to set a new world record for a salt water scuba dive at Lauderdale-By-The-Sea in Florida. One year earlier, in 2013, Jerry Hall of Kingsport, Tennessee, set the world record for the longest freshwater scuba dive without surfacing by spending 145 hours, 31 minutes living on a platform 15 feet below the surface of South Holston Lake. In 2015 there will be a new attempt, and if successful, will result in more than a Guinness record – it will also benefit an organization dedicated to helping those with life-threatening medical conditions.

This December, a nonprofit group called Project Nautilus will attempt to break the Guinness World Record for the longest open-water scuba dive by attempting to keep a diver submerged on scuba for 100 hours. In the process, the organization will be fundraising for the Make-a-Wish Foundation with a goal of raising US\$1 million. The dive is scheduled to take place in December 2015 off of Coki Beach on the island of St. Thomas in the U.S. Virgin Islands. Like most record dive attempts, the effort will require a considerable effort and logistical planning. Project Nautilus is currently looking for volunteers to help in the attempt. 



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# Legendary Palau

Lying south east of Philippines and seven degrees north of the equator, the Republic of Palau consists of more than 343 islands. And under the water is a feast for divers. ∞





“On the island of Ngibtal lived a lonely old woman. Her only son, Mangidabrutkoel, was often away. Every day villagers would pass by her carrying their catches of fish. Sadly no-one ever offered her any, even though she had no means of catching her own. After one particularly long period away, her son returned to find his mother most unhappy.” Nan, our taxi driver and self appointed tour guide, is a storyteller of note. He has brought us to the oldest traditional bai (meeting house) in Palau. The wooden roof beams inside the bai are boldly painted with traditional art depicting Palau’s legends. Nan points to a painting of a tree bearing fish, not fruit, and continues...

“Before leaving on his next trip the son wandered to his mother’s back yard where a large breadfruit tree was growing at the water’s edge. He chopped

off one of the branches. Water immediately gushed from the open cut flowing to the rhythm of the ocean and with each gush of water a fish leapt out. Envious of the old woman’s constant fish supply, villagers hacked down the tree. As they did, waters burst out in torrents, flooding the whole island. And that is why Palau’s oceans are filled with fish,” Nan finishes with a huge grin.

Located inside an atoll just south of Babelthuap, the biggest island in Palau, are Palau’s icons, a collection of over 200 islands known as the Rock Islands. Years of wear and tear by currents and crustaceans is eroding the limestone rock-face to form these unique mushroom-shaped islands topped with dense green jungle. The outer reef of this atoll faces the big North Pacific Equatorial Current. Exposed directly to this current is the



southern island of Peleliu. Since the currents form an endless conveyor belt of fast food for fish, Nan suggests that Peleliu is the best place to observe the legend of Ngibtal. He drops us off at Neco Marine dock where we will join the Aggressor liveaboard for a week of exploring reefs. “When you get back I must tell you the legend of Chaub the giant”. The big man waves goodbye.

Peleliu is approximately one and a half hours boat ride from Babelthuap. On route the ocean is a mosaic of cobalt blues and aquamarines, indicative of the varying depths. It appears calm and restful but we are assured that there are strong currents below.

Marcel, Aggressor’s divemaster instructs us firmly before our first dive. “Go with the flow. If you don’t see reef, surface immediately”. As the current nudges us along the ‘Yellow Wall’, Marcel’s words of advice soon slip from my mind. I admire the wall carpeted in buttercup-yellow soft corals. The perpetual rush of water restricts the soft corals growth but not that of the stronger black coral sea whips which extend far into the current, bending, twisting and curling as they get longer. I spot a green turtle intent on nibbling sponges. Distracted by my noisy bubbles he glares at me. Realising that I am no threat, he takes another mouthful and nonchalantly swims off in search of more delicacies.

Further down the coast I discover the rationale behind the naming of the dive site - ‘Peleliu Express.’ This is an exhilarating roller-coaster experience as we soar alongside the reef in crystal clear water. Using giant reef hooks we stop to watch the passing marine parade. Black-tip, Grey reef and White-tip reef sharks swim effortlessly against the current making us feel, well, human! Schools of tuna and travally congregate in shallower water forming constantly moving twisters. Spotted eagle rays and Mantas glide











past with their wingtips upturned as they enjoy the lift created by the current. Thousands of Pyramid butterflyfish maintain close proximity to the reef as they feast on the plankton borne by the current. As we release our reef hooks we momentarily join the rush of fish heading south but we have to surface as they continue on their journey. Nan was correct, Palau is full of fish.

We continue our expedition diving the reefs of Peleliu before heading up the west coast of the atoll. Ngedebus Drop Off, Big Drop Off and New Drop Off are all wall dives reflective of the adjacent ocean depths. But there is no need to dive deep as we find plenty of fish life in the shallows. The reef plateaus are littered with stony hard corals, sponges, damsels, chromis and Anemone fish. The reef walls are frequented by pelagics, sharks and turtles. At 'Blue Corner' I again contemplate the legend Ngibtal – did it emanate from the imagination of a villager fishing



here? 'Blue Corner' is a shallow plateau that elbows into the deep Philippine Sea. No matter the time of day, or the strength of the current, fish congregate in numbers on the reef edge. Chevron barracuda and Big-eye jacks assemble in a large swirling mass above the reef while giant Barracuda swim from one corner of the reef to the other. A variety of sharks constantly patrol a few metres below the reef edge. Green and Loggerhead turtles and Devil and Eagle rays are frequent visitors too. Schools of Bumphead parrotfish meander haphazardly over the reef, crunching sporadically on hard corals. The reef is constantly abuzz.

A short swim away from busy 'Blue Corner' is the peaceful 'Blue Holes.' Four vertical tunnels drop from the reef plateau into a giant chamber and flickering rays of sunlight filter down these shafts creating champagne sparkles from our air bubbles. At the very bottom of the giant chamber is a small





opening leading into the forbidden 'Temple of Doom', a series of inter-leading caverns. Inside it is so dark that torch light appears to be sucked in, reminding me of that big black hole somewhere in space. A stray beam from my torch settles on a turtle skeleton. The sight sends shivers down my spine – if the turtles can get lost in this black hole and die, then so can I! The water suddenly feels icy cold. I say a prayer for the turtle's soul and another for my safe return to the surface as I rapidly retrace my path back out.

On an incoming tide fish congregate at the channel entrances of the atoll. Nan also recommended these as being an ideal spots to observe fish. At German Channel we shelter from the current behind a large coral head and wait patiently. Within minutes a huge Manta ray emerges from the distance gliding gracefully towards a nearby coral bommie. On cue, a school of Blue cleaner wrasse spring into super preening mode, pecking and nibbling the wings and belly of this gentle giant. The Manta's wings shudder slightly. Was it ticklish or pure pleasure? Apparently satisfied, the Manta soars gracefully away and the wrasses loiter while waiting for their next patron. A Scalloped hammerhead shark makes a brief appearance but doesn't stop for the free cleaning service. More Mantas arrive and leave keeping the wrasse busy.

At the entrance to Ulong Channel we watch Black-tip and Grey reef sharks patrolling before we emerge from our sheltered position and allow the current to carry us up the channel at full speed. It is the mating season for Yellow-margin triggerfish who resent our presence. These aggressive fish continually charge at us, baring menacingly large front teeth, luckily only finding contact with our fins and not our limbs. We retreat to the shallower centre ridge where we find large green coral trees, giant clams and blooming soft corals basking in the current. A giant Moray eel peeks

out from beneath a plate coral. I remember Nan telling us a legend about a snake with two heads. Or was it an eel? I forget. I let the current carry me into the still waters within the atoll.

High up amongst the Rock Islands inside the atoll are a number of lakes that were once part of the ocean. Millions of jellyfish trapped in these lakes have not only lost their ability to sting but have evolved from being fish eating creatures to passive photosynthesizers of light. It is the last day on board and Marcel gives us our final briefing for an exclusive snorkelling experience in Jellyfish Lake, the only such lake open to tourism.

"Start swimming towards the sun in the middle of the lake. At first you will see one jellyfish and then another. Swim a bit further and you will see more. Swim further until you are at one with the jellyfish."

With that we head up and over the steep hill to the lake. As I start finning I spot one jellyfish, then another, then more. I swim further.





By Jeanne Liebetrau and Peter Pinnock

Eventually I feel as if I am the crouton in a jellyfish soup. Jellies of all sizes are bobbing along in all directions, clambering for sunlight. I take a big breath and swim a few metres below. I feel a tingle on my lips as I brush past some tentacles. Apparently one out of every thousand people are allergic to the stings. I am not one of them. I slowly surface through the pulsating mass of jellyfish. This certainly is a freaky experience; it just needs some weird movie sound effects. I take note to ask Nan if he knows of a legend about the jellyfish.

Our faithful taxi driver is waiting on the docks for us when we get back. Nan gives a huge grin. “Welcome back. Did you see all the Breadfruit tree fish? Today I take you to see a traditional war canoe and then this afternoon you can go canoeing Rock Islands. Yes? Lets go.”

Travel info:  
Location: Micronesia, seven degrees north of the equator, SE of Philippines  
Language: Palauan yet English is widely spoken  
Visas: US required for transit via Guam  
Getting there: Fly on Continental Airlines via Guam or Manila  
Currency: US Dollar.  
Best time to go: Excellent diving conditions all year with December to April being the drier months. From June to August the rainfalls can offer respite from the heat but also cause rougher seas.  
Water temp: 28°C throughout year  
  
For a gallery of Palau, visit: [www.peterpinnock.com/gallery.asp?galleryname=palau](http://www.peterpinnock.com/gallery.asp?galleryname=palau)  
  
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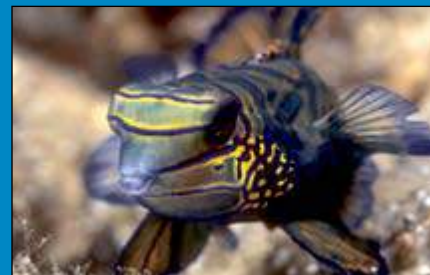
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# Banda Islands

‘The Spice Islands’ is a name that prompts the imagination to think of delectable cuisine from exotic menus accompanied by delicious odours wafting through a restaurant overlooking an azure blue sea. The reality is that the Spice Islands are nothing like that at all. Once the most coveted islands in the world, over which blood was shed, the 10 islands making up the group are now scraps of prime real estate in a distant corner of eastern Indonesia.





In 1511 the adventurous Portuguese discovered the Banda Islands (their real name), the only place at the time where nutmeg and cloves were grown. Nutmeg and mace, the bright red aril of the nut, were used to flavour food fit for kings and queens. The stringent piquancy of cloves were also used to enhance food but more to improve the taste of badly preserved meat to make it more palatable. A rather insane use was clove potion that was believed to extinguish a lover's anguish. It was probably the mild anesthetic and tingling sensation on the mouth that were the only effects. Nevertheless these spices were once considered worth their weight in gold.

The Portuguese monopoly of the spice trade ended in 1599 when the Dutch arrived and the real fight for the islands began. Two years later the British East Indian Company arrived, followed shortly by the Spanish in 1606. The interest in the islands waned once cloves and nutmeg were successfully cultivated elsewhere in the world and the Spice Islands were mostly forgotten. Interestingly, it was in the Treaty of Breda in 1667, where the English, who weren't keen on war, agreed to relinquish the



Spice Islands in exchange for the Dutch held island of Manhattan.

The Sevenses liveaboard cruises through these islands leaving from Ambon, the traffic hub of the Maluku's, through Misool, the centre of biodiversity, to Sarong, the logging hub of the remote province of Papua. The Banda's lie 160km south east of Ambon. It's an overnight trip to



the first stop, Nusa Laut, an island located at the south-eastern tip of Maluku. Calm clean water beckoned this weary traveller to get submerged. First impressions last – in this case it was the variety of prolific hard corals in the shallow waters inhabited by schools of dancing Purple anthias, brilliantly coloured Coral trout scurrying between the coral heads, neon blue Cleaner wrasse waiting for customers, Mantis shrimps scurrying into reef holes, sunshine yellow Crinoids gripping onto the last promontory of seafans and an infinite number of reef fish moving through the shallow waters. It may be a check-out dive but it has all the elements of a healthy Pacific reef.

Suangi Island is reached after the second overnight leg. This densely forested small island is populated by thousands of frigatebirds. Overhead, the sky is speckled with screeching birds as they soar around the island peak, below, the reef plateau is carpeted in muted coloured leather corals and banks of hard corals. On the edge of the drop-off blue tube sponges shaped like organ pipes extend beyond the reef. An endless passage of fish seemed to be



heading towards the indigo blue depths enticing me to follow, but sanity prevailed - the best reef is in the first 10m.

Closer to the Banda Islands is the uninhabitable volcanic island of Bata Kapal. It is sometimes referred to as 'Ship Rock' because of its shape and the wake made by currents as they hit the island. Four submerged sea mounds are interconnected by







saddles, and it is here that currents emanating from the Banda Sea, the deepest in Indonesia, collide. As the different temperatures mix the visibility becomes fuzzy. The fish don't have a problem – they are all present feeding on the torrent of nutrients. Fusiliers, Surgeonfish and thousands of Pyramid butterflyfish pepper the water as they take advantage of the food feast. Just off the reef a team of Dog-tooth tuna patrols with intention to kill. Nervous butterflyfish and fusiliers scatter towards the sanctity of the reef. It has been said that the Banda Islands population of Dog-tooth tuna can sustain the islanders' needs without going into decline.

### Steeped in history

After seeing so many fish we had to visit the islands to find the spices. Banda Neira, the main island, is steeped in history. A visit to the museum gives one an understanding of the spice cultivation and bitter battles over it. Throughout town many of the colonial buildings have been restored, as has the Fort Belgica situated strategically above town with the original cannons aimed to protect the fort. From here there are panoramic views of Banda Neira, Banda Besar and Gunung Api, the active

volcano, and of course, nutmeg and clove trees that grow everywhere. Contrary to the saying I saw very few big fish on sale at the market – perhaps I was late but the sight of fish sent me back to the ocean.

Directly in front of the Maulana Hotel, in amongst rocks, rubble, old light bulbs and rotting rags lives a community of Giant mandarinfish. These mandarinfish are so big I thought they were on steroids - they exceeded the 6cm maximum size that is quoted in fish books. I speculated whether this was from the spices or the nearby volcano.

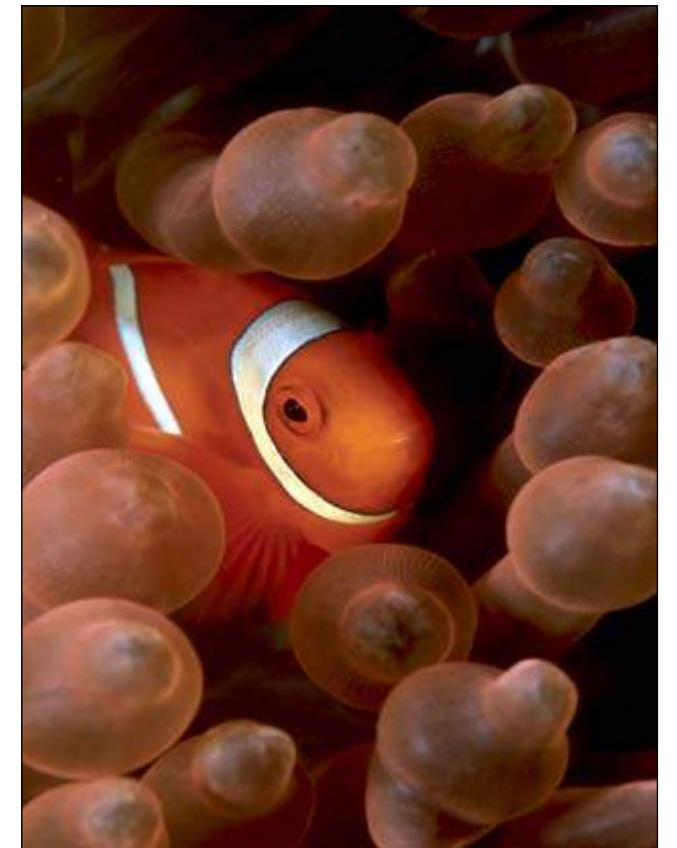
Heading north away from spices but towards more fish are the remote islands of Misool. Seemingly isolated, the fish here should have a better chance of survival. This area is known for its unpredictable currents which are the key factor in the astounding statistics of fish and corals found here. Once again first impressions last. In Misool it is the colours of the soft corals that are mind-blowing - blooms of orange, purple, red, yellow, pink, green and white in an outrageous landscape design. Added to that are the multitude of goldies and glassfish that horde around the soft corals. Then there is the noise to contend with - when the current is running there is



a clickety-clack of snapping mouths and crustacean claws, a whoosh of swarming fish and crackling of coral fronds chafing. The reef is totally alive with activity.

### Unmissable reefs


Misool has some really weird shaped reefs. Razor Reef is a series of sharp ledges running the length of the island that jut out at an angle – much like the shape of a pineapple. Bushy hard corals and blossoming soft corals break the harshness of the reef structure. The three holes that pierce through Jamur Boo Island may be easily seen from the surface and easy to pass through underwater, but with the current it is not so easy to return as my dive buddy found out! The island was probably once connected to a smaller island 100m away, because it is as if someone took an angle grinder and sliced vertically through the island to break it up. Large chunks of rock with sheer sides are spread over the reef with huge seafans and barrel sponges occupying the shallow valleys in between. As I ducked into one of these to escape the current I discovered Pygmy seahorses living comfortably in the fronds of a seafan. Ferundi's Cave is not quite so unusual but one does swim under an island through the cave





to access the reef wall. Further along the wall is a large cave that you can enter from underwater and surface inside to the sounds of bats overhead. I was so engrossed in watching a well nourished Banded seasnake in its quest for food that I missed the second cave.

Even further north are the islands of Fam. Melissa's Garden can be affected by currents from all directions hence it is rich with soft corals, leather and brain corals whilst Wobbegong and Epaulette sharks often rest in the shelter created by the coral heads. When the currents are too strong the island of Kerua is dived. A steep wall on the one side is where the funky Orangutan crabs live inside hard corals. The small yellow robust sea cucumbers have colonized this wall and it is also a haven for nudibranchs and starfish. A slit in the wall is where a family of Lionfish work together to trap errant Glassfish. Their gluttony reminded me that it was dinner time.

That night the Sevenses served batter-fried fish for dinner. I grated some fresh nutmeg over and contemplated the combination of spice and fish. Yes, it is a good combination. 





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# Coral Strand Hotel

Right on the wonderful golden crescent of Mahé's famous Beau Vallon Beach, the Coral Strand Hotel has long been a favourite of divers and other holidaymakers seeking an affordable tropical island escape.

And since its only 20 minutes from Seychelles International Airport and ten minutes from Victoria, the island's quaint capital, the hotel is also popular with business visitors. And although it has recently enjoyed a facelift with the creation of a new business centre, an upgrade of rooms, a sprucing up of the main restaurant, pool bar and kitchens, it still remains excellent value.

The hotel comprises of 130 air-conditioned and newly refurbished rooms, most of which are sea facing and are grouped around the large swimming pool and gardens. The main dining area, the Island Trader, is right on the beach with a view to die for, yet there is also the external a-la-carte Le Bistro restaurant, while at Mahék, the Indian Gourmet Restaurant, diners can watch the chefs at work in the 'show cooking' kitchen.

Non-motorised water sport equipment, including bodyboards, windsurfers, hobie cats and snorkelling gear, are available free of charge and hotel guests can enjoy discounted motorised water sports such as waterskiing and jetski hire. A big attraction is that one of my all time favourite dive centres, the PADI 5 star dive centre Underwater Seychelles, is right next door so I've had several visits to the Coral Strand over the years.

I love diving in Seychelles – the water is warm, the visibility is good, the dive sites are only a short boat trip away and the variety of fish and coral always impresses. There are only a few dive operators so you rarely find two dive boats on one site, but most importantly, the standard of guiding and the general professionalism of the dive staff at Underwater Seychelles ensures that they have a loyal following of regulars who





By Fiona McIntosh and Shaen Adey

return year after year. Over the years I've been treated to fabulous sightings on the submerged granite rocks – everything from dramatic drop-offs adorned with Gorgonian fans to pretty coral gardens, turtles to leaf fish, colourful little nudibranchs to Whale sharks. If you've always wanted to see the biggest fish in the sea then go between August and October when the coast of Mahé is brimming with the critters – if you don't see them on the dive you can sign up for a snorkelling trip with The Whale Shark Monitoring Programme, which assesses the occurrence and distribution of Whale sharks by aerial and boat-based surveys. Since the surface swimming habits of the sharks means that encounters on snorkel are easy, paying visitors are allowed to help the scientists with the research. At 100 Euros a pop it's not cheap, but trust me, it's worth every cent.

Contacts:  
\* Call +248-621-000, send a mail to email@coralstrand.sc or visit www.coralstrand.com  
\* For more information on Seychelles

Underwater Centre & Dive Seychelles, visit [www.diveseychelles.com.sc](http://www.diveseychelles.com.sc)  
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# Lust for rust

- experience wreck diving in Micronesia.

## Part I





Dan glances at the daily itinerary, scratches his fine curly hair and shifts a wad of Copenhagen chewing tobacco in his cheek. He digs out a diagram of the Yamagiri Maru from a fat file, shifts the Copenhagen to the other cheek and starts the briefing.

“The Yamagiri Maru was a transport ship which sank from a torpedo hit and rests on her port side. We will enter the wreck through the torpedo hole, swim through her holds and then to the engine room, finishing up on the bow gun and kingposts. The engine room is interesting because...” Dan drifts off as he thinks of ‘his’ engine room. He remembers that he should be telling us about the large shells in one of the holds. Adjusting his moustache he chews on the Copenhagen once more and continues.

“The drums inside the hold were obviously full as they maintained shape during the

sinking. But the engine room... I love engine rooms. You gotta see this one.” With that and a few gestures towards the diagram we are off for our first dive. Dan checks his well worn gear – eight years of diving on these wrecks have taken their toll. He takes another mouthful of Copenhagen and makes sure we are all ready to roll off the boat.

With his lime green shark-fin neoprene hood, bony bare legs and old fashioned fins, it is easy to follow Dan. He disappears through huge plates of twisted metal on the hull and waits patiently while we examine the huge shells capable of sending a projectile 42km, loads of sake bottles and the fuel drums. I sense he is itching for us to follow him into ‘his’ engine room. We squeeze through railings and under loose cables, all the time making sure that our elbows and heads do not bump against the rusting metal. Inside the engine room are three large cylinder





heads sealed with impressive sized bolts. In a corner we encounter a grim reminder of the war – a skull embedded in the ship's hull. The sailor was clearly killed on impact when the force of the blast sent him flying and crushed his skull into the battered hull. The fire that ravaged the engine room blackened the skull. This is a true war grave.

## Truk Lagoon

Truk Lagoon (as it was then known), was a Japanese naval base during the Second World War. The isolation of the islands and the limited entrances to the lagoon made it a seemingly safe base, although the Japanese did not bargain on the formidable air attacks on February 17, 1944. American forces known as Carrier Task Force 58 launched an attack code named Operation Hailstorm. US Hellcat fighters, Dauntless Dive Bombers and Avenger Torpedo Bombers departed from aircraft carriers at two hourly intervals. The strikes continued for a day and a half, sinking the Japanese fleet, crippling the infrastructure on Truk and destroying 270 aircraft.





Dan has a self-confessed fetish for engine rooms. "Always judge a wreck by the quality of the engine room," is his worldly advice to us. Inside the Kiosumi Maru he points out many intact gauges complete with both Japanese calligraphy and English numbering clearly etched on the dials. Large wheels and knobs are waiting to grind the engine into action again. Strangely, the fragile glass on the light bulbs is not broken; this after the ship was torpedoed and shelled from above. In an area above the main engine room we find an intact gas mask. To get to the engine room of the Kanshu Maru we follow Dan head first down three flights of stairs, rounding corners on each landing. Gauges, dials, thermometers and large boilers fill this compact engine room. Interestingly, the Kanshu's engines were manufactured in England. If the British had known this was to be the fate of their engines would that have changed the pattern of war?

Outside the Gosei Maru, Dan waits patiently for us to finish admiring the phenomenal coral growth. Soft corals drape every porthole and opening while hard corals grapple for space on the funnels and hull. Curving gracefully over the wreck the davits are dripping in soft corals and the cargo booms are festooned with marine life. Glassfish dance around the metal struts. The midship hold contains several huge torpedoes that were scattered during the sinking, some apparently exploded but since they weren't armed with warheads, the damage was minimal. Finally we allow Dan to escort us to the engine room where the neatness of the tool racks on the wall complements the beauty of the outside of the wreck.






A total of 31 of the 41 ships sunk at Truk were civilian ships refitted for the war efforts. The Japanese, suspicious of an attack after spotting a reconnaissance plane circling high above the lagoon, had ordered most of the fleet to evacuate. Battleships, cruisers, destroyers and submarines left. The suffix 'maru' refers to those destined to return to civilian duties.

The Rio de Janeiro Maru was both a passenger liner and cargo ship. One of her holds was packed full of beer crates to serve the troops on victory. Most of the wood has rotted away leaving heaps of beer bottles scattered around, the sight of which had me singing about 99 bottles of beer on the wall as I descended flight after flight of stairs heading down towards the engine room. The engine room was full of gauges, dials and thermometers and a distribution board complete with electrical switches.

Also a passenger ship, the Heian Maru was fitted out as a submarine tender. The passageways are stacked with periscopes while torpedoes and warheads are stored in the



holds. It is easy to enter the wreck through the massive hole torn by the torpedo hit. After that it requires some manoeuvring skills to get to the engine room. Obediently we follow Dan over railings, down ventilation shafts and under cables. I shine my torch around the tightly constructed room appreciating the machinery. Haunting hollow eyeballs stare back at me – I realise my beam is shining on a skull. I pause for a moment and then exit the tomb. May that poor soul rest in peace. 





# Photographic Competition



Darren Ninham took this photograph of a Leaf fish with a Sony



Errol Brest took this photograph with an Olympus camera.



Karen Deller took this photo with a Fuji FinePix



Lappies Labuschagne used a Canon to take this snap..



Leon Goosen used an Olympus for this photo




Lydia Moncrieff took this photograph with a Sea & Sea





Marthinus Coetzee took this photograph with a Sony. 



Ian Coetzee took this photo with a FUJI. 



Russ van Aardt took this photograph with a Sony. 

## How to enter your photograph

Whether you're an amateur or professional photographer, this is a photo competition for all levels of photographers. We're looking for pictures that capture the true experience of scuba diving and the wonders of the underwater world.

### Submit your photo!

- Photographs may be taken above or below the water, as long as diving remains the theme.
- The Name of the photograph must be the photographer's name.
- Photographs must not be bigger than 5 MB per photo.
- Submit your snaps in high-resolution (at least 150 dpi) in jpeg format.

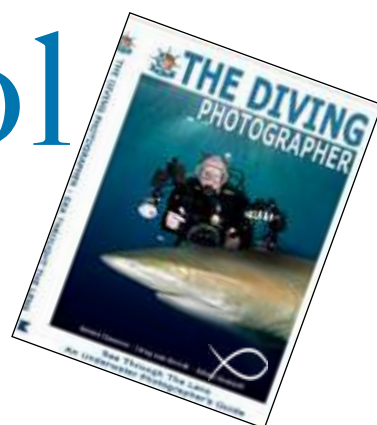
Visit [www.ozdiver.com.au](http://www.ozdiver.com.au), click on the "photographic competition" link and follow the steps.





# Photo School

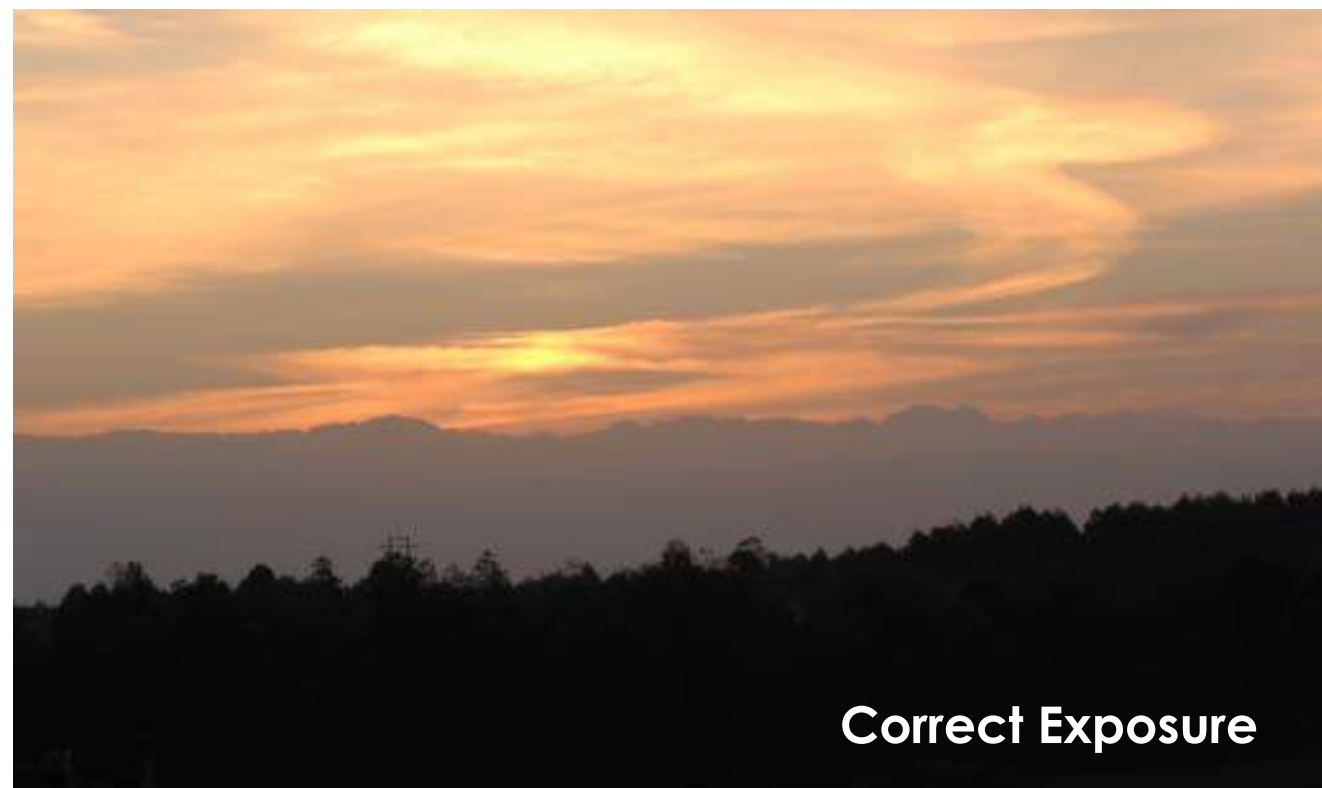
## *Expose it right underwater*



In part four of “Expose it right underwater” we are going to look at ‘film’ sensitivity and the different methods that can be employed to get the correct exposure. Up until now we have discussed light, aperture, shutter speed and touched on depth-of-field. In this article, I am going to throw everything together and attempt to create a practical illustration of what you can go out there and practice.

When we talk about film sensitivity, we use

the term ISO. On many cameras today, this can be set either manually or automatically and it has a variety of different values. If we have an ISO of 100 then it is considered to have a slow sensitivity but a good colour saturation. An ISO of 100 can be used for close-up or macro photography, especially if you are making use of strobes. On the other hand, if we use an ISO of 1600, then we talk about a fast sensitivity but the result is very noisy. This ‘noise’ is seen in the form



**Correct Exposure**

of small dots all over the photograph – in the old days we used to talk about the ‘grain’ on the photographs. This ISO is very useful in low light conditions and deeper water. Changing the ISO of the camera allows you to have more freedom in changing the shutter speed or the aperture depending on the light conditions you are faced with.

There are many ways of setting up the camera to achieve the correct exposure but not all of them are going to be very practical underwater. For example, a tripod underwater is not very realistic. You also don’t have infinite distance and unlimited light to work with, so we need to improvise.

There are some basic settings which will help you to get off the ground and grasp a better understanding of this concept. If you can set your camera to some sort of pre-setting then this could reduce the task loading that you are faced with – you are probably not going to remember everything in the beginning anyway. A good start would be to set your camera to aperture priority. This means that the camera will automatically set the required shutter speed to obtain the correct exposure. Another way to ensure good exposure is by ‘bracketing’. This is traditionally taking three photographs with one f-stop below and one f-stop above the recommended exposure. For example, if f8 is the selected aperture, then take two extra photographs using aperture settings of f5.6 and f11 – this will allow you to choose the best result. The same can be done when shutter speed has been set as a priority. Never just settle for one photograph, always

take multiple photographs with varying settings to try and get the correct exposure. As you become more experienced and gain more confidence with your camera, you will be able to start using the full manual option and really become creative with lighting. Remember that photography is after all just painting with light. In the next issue I will be discussing strobes and strobe placement. ■



**Over Exposure**



**Under Exposure**



# Photo Editing

You are on a dive and you spot a lion fish hovering above the reef in a perfect pose. Wow this is the moment for a fantastic photograph! You set your camera up for the photo and get into position and click – flash you have it. You look on the small screen on the camera and smile to yourself thinking, that will be the best photograph of the dive! When you get back on land you show your friends and brag about your stunning photo.

## Bringing out the colours

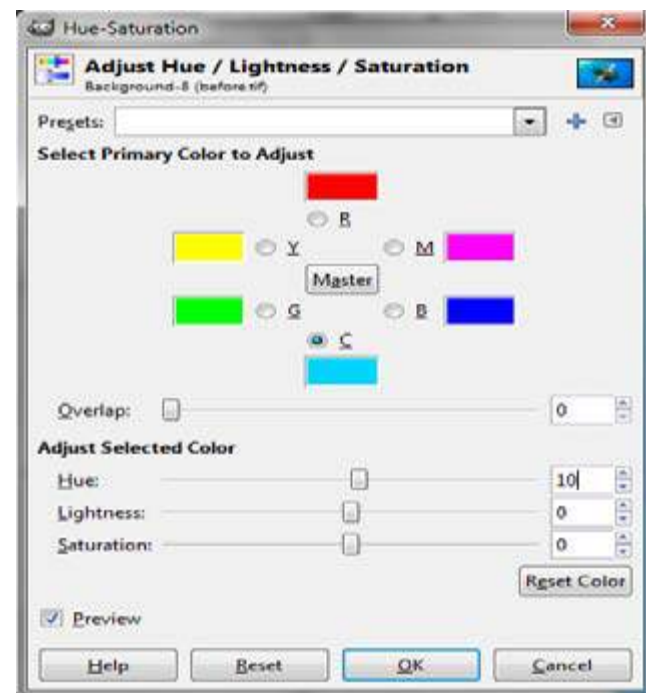
Later you eagerly connect the camera and download the photographs of the dive and browse through them. Your heart deflates and you get that sinking feeling that this was just another bland photograph to go with the rest! Disappointed you close the folder and then perhaps in a few weeks you will open it again to remind yourself of the dive. This does not necessarily have to happen... With a little patience and a few tricks on the computer with Gimp you will bring back those colours you saw and your photograph will be promoted to your desktop background!

These days software has improved considerably and a bland photograph can be turned around. There are important things to learn about taking photographs underwater and the combination of this information with editing skills learnt then you will get much more out of your dive photographs.

Colours filter out under water  
Colours get absorbed the deeper you dive. Red gets absorbed first by water followed by orange and yellow. The following gives you an idea what colours are filtered out at different depths:

- \* Red – 4,5m
- \* Orange – 7,5m
- \* Yellow – 10-14m
- \* Green – 20-23m

To overcome this you will need to use a strobe. It is always better to have an external strobe if possible as you will be much



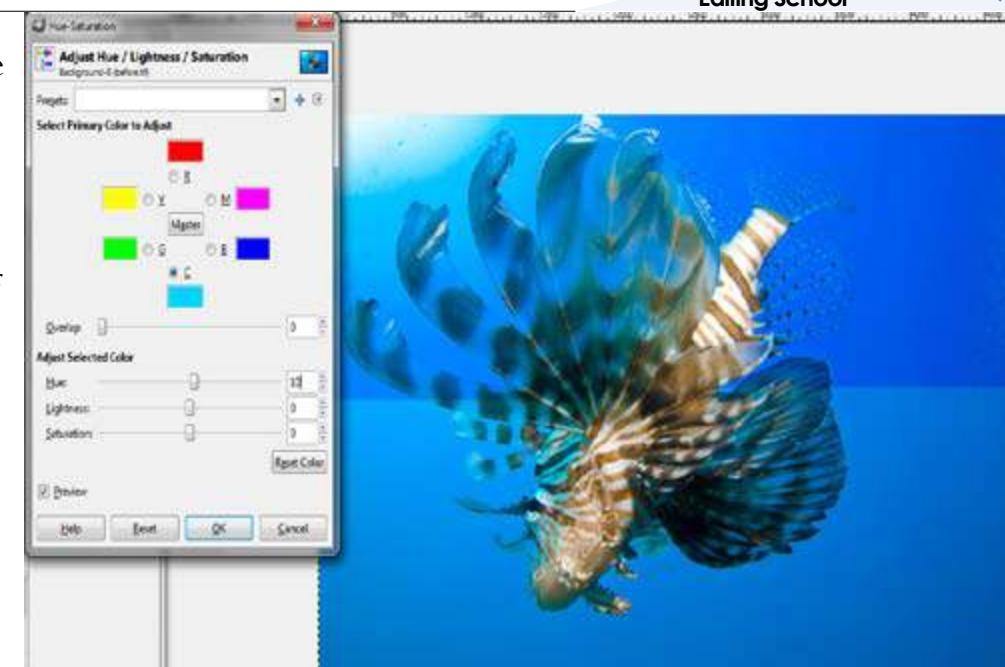
more flexible when controlling where the light goes to avoid backscatter.

Get close!

Due to the density of water and depending on the visibility you will need to get as close as possible to your subject to avoid any discolouration. The further away you are from the subject the more the colours will fade out.

Get flashy

Always try to use a strobe (flash) on a dive



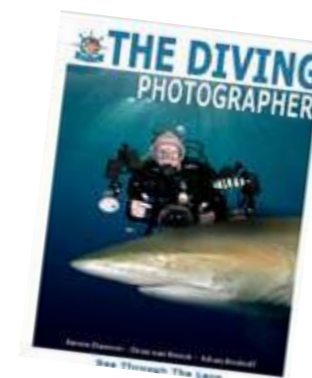
to enhance the colours. The strobe will light the subject and bring out all of the colours. Please remember that you still have to be close as the strobe alone will not compensate colours from a distance. Ideally you should not be further than 30cm away from your subject.

Shoot in RAW if you can

Most new compact cameras are coming out these days with RAW technology. RAW is a highly detailed format which allows the user to adjust exposure, white balance, individual colours and much more. RAW captures all of the information from the sensor and stores everything instead of the flat image of a JPG. You can adjust nearly anything on the photograph from a RAW file and nearly all professionals take photographs in RAW format. ■



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# A home in the sand

“...and the rain came down and the wind came and the house on the sand fell flat.” This old Sunday school song echoes through my mind as I watch a jawfish painstakingly build its sandy home. Why build a house inside a perpetually moving environment?





Sea sand is perpetually moved by currents, wave action and constant traffic, not to mention storms and tsunamis. Sand varies in colour, constituency and in the size of its grains. It goes by a variety of names: seashore, desert, earth, sediment, silt, mud, dust, beach and clay. It is not water-soluble and consist of minute fragments of silicon, quartz, lime or volcanic elements, finely crushed shells corals and rocks, urchin spines, moulted skeletons, sharks teeth, even faeces.

The creatures using the sandy realm of the ocean can be divided into those that live inside, those that live off the sand and those that are not inside, but on top. Living inside we have the likes of the pugnacious jawfish. He needs to move fast to build a home and sanctuary from predators. His home, when finished, will have intricate tunnels and underground caverns, and can take hours to complete. First he performs oral earthworks, digging a large pit. He places each mouthful of sand nearby in a heap. Next he pulls larger broken corals and shell pieces, which will form the framework of the walls. Then he moves all the excavated sand back as reinforcement. One large piece of coral or shell is left near the entrance, to be used to close the front door each night.

Jawfish are not the only ones to sport designer front doors for their sand houses. Snapping shrimps cohabitate with gobies. The shrimps act as mini-bulldozers as they use their claws to continually push sand out of the burrows. They maintain the commune, while the gobies serve as a private security company alerting the shrimps of any dangers. At dusk they both head indoors, the

shrimp pulling the door shut. First thing in the morning the goby bursts out of the house, breaking the door down and taking some of the framework with it. The shrimp does not take offence to the fact that the front door is destroyed every day; he is resigned to his morning handyman repairs.

Garden eels do not enjoy the sharing of their home, which they construct by digging into soft sand with their hard-tipped tails. A few snake-charming moves pushes the tail deeper, while the dorsal fin undulates rapidly to transport the disturbed sand out, conveyer-belt style. The excessive slime on their body cements sand particles together, thus constructing a more permanent tunnel. The tunnels are spaced apart proportionate to the length of the eel – each being within reaching distance of a neighbour. As friends and family are all within an eel's length, garden eels seldom venture out of their homes.

Their cousins, snake-eels, are regular migrants though, and only use their homes as hideouts. A snake eel's eyes are situated at the end of their nose, enabling them to bury themselves to the eyeball while watching for tasty passers-by. One lunge and the passer-by becomes a road victim, leaving the snake eel's home in need of serious construction work.

Another relative, the blue-ribbon eel, is generally a loner, although they do not mind sharing a hole with a mate. There is speculation as to whether blue-ribbon eels actually build their own homes, or use tunnels created by others. They maintain the home with the same









body-slime cement mix, but only for a short while before moving on to greener pastures.

Mantis shrimps are tunnel dwellers too. They earn their name from the manner in which they position their claws, just like a praying mantis. Their real claim to fame, though, is that of being the fastest claw in the west. The claws can deliver a smash equivalent of a small-calibre bullet. Once the mantis has kicked its prey to death, he drags it back to the underground cabin for a feast.

Bobtail squid live in the sand during the day and venture out at night. These little guys are only five centimetres big, but they have eight arms, retractile feeding tentacles and fins on either side of their body. Swimming mid-water, the tiny bobtail squid can easily become hors-d'oeuvres. For defence purposes, they employ glow-in-the-dark bacteria, which they allow to live within the gill cavity. The bobtail squid adjust the amount of light emitted from this cavity, depending on the moonlight conditions. Once correctly lit, the squid is invisible from predators below. The bacteria are pretty safe inside the gills, and lighting up pays the rent.

The creatures living on top of sand are often disguised. Take flounders, for example. In the larval stage of their lives they are pretty normal, in other words, they have one eye on each side of the head. Then the one eye moves to the other side and the flounder ends up with both eyes on one side of its head. With the eyes in this position, the flounder can bury itself in sand, leaving the eyes sticking out like periscopes. These eyes move independently, looking left and right for pedestrian crossings and overhead swimmers. Fish shrimps and crabs often end up on the flounder's dinner platter.

A common trend for creatures living on top is to pretend to be flotsam wafting with the surge. Waspfish, a member of the scorpionfish family, have venomous fins and are not edible, but it still disguises itself for protection, looking like a large swaying leaf. Similarly robust ghost pipefish resemble long, thin decaying leaves, while seahorses can resemble either sea grass or rotting bark.

Sea cucumbers and starfish roam the sandy plains. Starfish have no head, no brains and hence no fear. They do not use any disguise, as their poisonous skin is enough of a deterrent. If this fails, starfish can drop a leg, which hopefully keeps the attacker occupied while they attempt a quick getaway. The leg will regrow over time. The sea cucumber's ultimate weapon is to disembowel itself – it pushes its intestines through the anus. At first the sticky mass adheres to anything nearby, then a chemical reaction with seawater causes it to solidify, trapping the attacker. Both these guys are municipal refuse removers, moving

at their own pace (allegedly about nine meters an hour). Along the way they pick up detritus through their sucker feet and regurgitate it as cleaned sand.


Sea pens require one sturdy foot to anchor themselves in mobile sands. This foot can spiral down into the sand, withdrawing the pen-like quills with it. Sea pens prefer to live in current-rich areas. By imbibing water they pump their body to a size strong enough to stand upright against a strong current. They then sieve the current for nutrients necessary to survive and maintain their physique.

The soft-bodied tubeworm builds tubes in which it can move freely. The tubes differ in architectural styles and are made from grains of sand solidified together with slime. Some worms prefer short tubes, some prefer long; most choose to build on claylike substrata. The Christmas tree tubeworm chooses the constraints of hard coral for extra protection, from where it reaches out to filter for plankton and micronutrients.

Certain species of anemone also live on top of sand. Corkscrew anemones are often found on desolate sand banks. Clownfish love corkscrew anemones, and the whole family snuggle under the folds as if the anemone is a giant duvet. The anemone, however, does not pay much attention to its bed mates – when scared it will retract into the sand, leaving the clownfish completely homeless.

There are also those that live off the sand and destroy all the underground homes. Goatfish use chin barbells, complete with taste buds, to forage through the sand for tasty bits. They look for invertebrates such as copepods, amphipods, ostracods, nematodes and shelled protozoa. When it finds this food, the goatfish grabs it with a mouthful of sand. Most of the sand is blown out of the gills, and what is not sifted is regenerated as faeces. Even more destructive are members of the ray family. Rays have highly developed electro-receptors. If they sense food in the sand below, they crouch over the spot, make a cloak with their fins and suck the sand up through the gills, grabbing what is edible and sifting the rest out. Any home under the sand is completely wiped out – and the occupant is lucky if he survives the attack.

All this sand being used for underwater constructions, masquerades or food sources does not change my mind. I do not like sand. It gets in wetsuits, damages o-rings and causes cameras to flood, and suspended sand creates havoc with backscatter in underwater flash photography. But it sure makes a home.

For more underwater images and stories visit [www.peterpinnock.com](http://www.peterpinnock.com). 





# Biorock –

## Karang Lestari – Saving a community



At the foot of the Pulaki Mountains in the northwest of Bali, lays the beautiful bay of Pemuteran. Here you can find spectacular reefs and a huge variety of marine life only a five minute boat ride from the coast. It is a real divers' paradise with coral gardens, drop-offs, muck dive sites and even an underwater temple! However, the story of Pemuteran was not always a happy one.



By Karin van Beeck Photos : Dray van Beeck

In 1998 two things happened which caused a disaster in Pemuteran. First the Asian economy crashed and Indonesia was especially hard hit by it. It caused thousands of economic refugees to stream into Bali in the hopes of finding work here. Many who could not find work found that the only way to provide for their families was to fish in the waters around Bali, and unfortunately quite a few turned to dynamite fishing as the fastest way to turn a profit. Others practiced cyanide fishing, where poison is used to stun fish that can be collected for the aquarium and live fish trades. The problem with both of these fishing methods was that it not only allowed them to catch the fish they wanted, but that it also led to the destruction of the reefs.

The second disaster in 1998 was that it was an El Nino year. El Nino is a natural phenomenon which causes the temperature of the oceans to rise. It is not caused by global warming, but scientists believe that global warming is causing El Nino years to occur more frequently and last longer than in the past. Corals live in symbiosis with algae called zooxanthellae which provides coral polyps

with food, oxygen and is also responsible for the coloration of different corals. When the water gets too warm, the algae abandon the coral polyps to float in the current as part of plankton. Without the algae, corals appear bone white and while not dead yet; they are slowly starving. If the water temperature drops, the algae will reoccupy the corals and they will survive, but if the water stays warm for an extended period, the corals will die. This is exactly what happened in many parts of the world, Pemuteran included, in that year. The corals bleached and could not recover, and big portions of the reefs died off.

The local community in Pemuteran in 1998 consisted mainly of fishermen, a lot whom still used traditional fishing methods. They were the hardest hit by these disasters, because they had to go a lot further to find fish and their catch was a lot smaller. The tourist industry was also in an uproar; because of extensive damage to the reefs; divers and snorkelers stopped coming and hotels and guest houses were standing empty.

The Pemuteran community leaders realized



that they had to take decisive action, and fast! First of all they banned all dynamite and cyanide fishing. To enforce this, they formed the Pecalang Laut, or Sea Guardians to patrol the reefs in Pemuteran bay with small, high speed boats. First time offenders were warned, the second time they got caught breaking the rules, the punishment was more severe. Illegal fishing methods slowly started to decline, but the breaking point came after the Pecalang Laut arrested a big group of fishermen who had bombed a school of tuna. They were all arrested, their catch confiscated and all the boats were impounded. After that there was a marked change in the attitude toward fishing in the region and bombing and cyanide fishing stopped completely. It also helped that the community leaders explained to people what they were trying to do and the reasons behind it.

Another big problem still remained. Most fish nurseries were destroyed and it would have taken ages for the fish stocks to go up again. There simply was not enough healthy portions of reef left to shelter juvenile fish. Help was coming from a totally different direction though! In the end of 1998 Yos Amertha, a Pemuteran resident who was also the President of the Balinese Watersports Federation at that time, attended a Coral Reef Restoration Workshop in Thailand. He met two men who would have a massive impact on the future of reefs in Pemuteran. They were Wolf Hilbertz, a German professor of architecture, and Tom Goreau, an American Marine Biologist. Both of them were worried about the decline of the world's coral reefs and believed that they might have found a way to make a difference. Wolf Hilbertz had just discovered that it was possible to grow 'rock' under water through mineral accretion, which is a natural process used by marine animals to build their limestone shells. He had found a way to speed up this process and hoped that it could be used to promote the growth of coral reefs. Tom Goreau had the scientific coral reef knowledge that was necessary; all they needed was a place to experiment to see if it would work.





By Karin van Beeck Photos : Dray van Beeck

Yos Amertha invited Wolf and Tom to Pemuteran in the hope that they could help save the reefs. They started their first experiment in June 2000. The first step was to build metal structures which would form the foundation of the artificial reefs. This was done with construction steel bars, also known as re-bar, about 1 to 1.3 cm in diameter, which was bent into different shapes and welded together. The advantage of using re-bar is that it is not very expensive, you can buy it pretty much anywhere and it is easy to weld together. This meant that these structures could be built pretty much anywhere in the world and that you did not need skilled welders either. They tried a few different designs and, once the first structures were built, they were carried out onto the beach, floating buoys were attached and divers and snorkelers pulled them out into the ocean. Once they reached the area where they were to be sunk, the buoys were pulled loose and they lowered the structures onto the sandy bottom in depths of between 3-6 meters.

The next step was to lay sets of power cables. The cables were buried deep under the sand on the beach and laid over the seabed. One cable of each set was attached to each of the metal structures to form a positive pole and the other to a titanium mesh or anode that was positioned a few meters away from each structure, to form a negative pole. Once everything was in place, the cables were attached to a power source on the land and an electric current of 12V started to flow through the cable. The whole setup worked as a galvanic cell underwater and an electrochemical reaction took place which raised the pH level of the metal, which caused minerals to accrete on the structures within hours of being connected to the power supply.

Once it was clear that the process was working properly, the scientists and some volunteers went to collect broken corals from the outlying reefs. The corals were transported in buckets of seawater to cause as little stress to the animals as possible. They were then attached to the structures with metal wires to keep

them in place. They tried to collect as many different coral species as possible, to maintain the same biodiversity you would find on a natural reef. All that could be done after that was to wait and see what would happen.

It soon became apparent that the experiment was a success! Most of the transplanted corals were flourishing. Normally hard corals grow their skeletons by injecting thin layers of limestone underneath the cup in which each coral polyp is sitting. This takes a lot of energy though, which is why hard corals tend to grow very slowly. The electric current flowing through the structures helped the coral to convert energy into limestone, which meant the polyps had more energy left over for reproduction and defense. The corals on the Biorock structures tended to grow 3-5 times faster than corals on natural reefs; were very brightly colored, supported dense fish populations and seemed to be more resistant to environmental stress.

This was a very important discovery, because reefs all over the world are in decline because of global warming and pollutants in the water. Reefs are extremely important, not only as marine life nurseries and for tourism, but also because they form natural barriers between the ocean and coast lines. Without coral reefs, billions of dollars worth of coastline properties will be destroyed. The only way to prevent this damage; is to build seawalls, of which construction costs will be incredibly expensive. Creating this kind of artificial reef with more resistant corals would allow us to protect coastlines and marine life habitats.

When Pak Agung Prana, the owner of Taman Sari resort in Pemuteran bay, found out about the successful experiment, he requested that a big artificial reef be built in front of his resort to act as a fish nursery for the rest of the bay. They started building it in 2003 and today it is 300 m long, covers an area of 2 hectares and consist of more than 65 structures. It is the biggest reef restoration and coral reef nursery of its type in the world.





Pak Agung Prana is still the biggest financial contributor to the project and pays for most of the electricity needed to power it, together with Bali Diving Academy and Pondok Sari. Most of the structures today have become limestone statues, covered in living coral which is providing a home for many different fish species. It also seems that the coral reef surrounding the structures, have benefited from the electrical field; it is very healthy and most of the electrical cables have been integrated into the reef.

To raise international awareness and to educate the people in the villages regarding the Biorock project as well as the conservation work of the Pecalang Laut, Rani Morrow-Wuigk made a film to document the process. This was a huge success and, together with the educational work Chris Brown from ReefSeen had been doing in the villages, had a major influence in stopping destructive fishing methods as well as preventing fishermen from fishing on the Biorock project. Actually, once fishermen saw how successfully the structures attracted fish, it was decided by the village to make another set of structures specifically for the fishermen to increase fish stocks that remain. What happened in Pemuteran caused a big change in the whole community and shifted the main industry from fishing to tourism. Fishermen started to offer snorkeling and diving excursions, as well as sunrise and sunset cruises to replace income previously made from fishing. They realized that ecotourism and protecting the reef benefit the community and as a result, most of the community is dedicated to making the program work. This total community support is unique to Pemuteran village but its success has inspired other communities throughout Indonesia who have initiated similar schemes. In acknowledgement of this achievement, the Community of Pemuteran was awarded various prizes, amongst them the Equator Prize 2012, a United Nations award for Marine and Coastal Zone Management, the SKAL for the World's Best UW Eco-Tourism Project and the KONAS Award for the best Community Based Coastal Zone Management Project in

Indonesia. The Biorock is a non-government project and is sponsored through donations from outside. Because so many people have expressed interest in helping, the 'Adopt a baby coral Project' was started a few years ago. For a donation of U\$35, your name gets shaped out of metal wire and attached to the structure together with a harvested coral. You will then receive photos of your coral via e-mail, to see how it is growing. The main reason the project is working so well, is because of the staff working at the Biorock center. They are responsible for making sure the electric cables are not dislodged, the power sources work properly, cleaning the structures when needed to prevent the growth of algae and too many sponges and also to ensure that divers and snorkelers do not damaged the corals. It is a full-time job which they do very well!

Today the Biorock reef is as healthy as ever with an abundance of marine life. Some of the structures have now been taken off the power grid to grow naturally while new structures have been connected. The first 'green' structure; the Coral Goddess, have been erected and is powered only by solar panel and wind turbine. It is not only the Biorock which is worth visiting though. Thanks to the ongoing work of the Pecalang Laut to prevent destructive fishing, the offshore reefs have completely recovered and are absolutely teeming with marine life. People come from all over the world to dive and snorkel here and all find it a very rewarding experience. We are certainly feeling blessed to live in a community which is taking conservation so seriously and has access to such wonderful reefs!

Biorock info : [www.biorockbali.webs.com](http://www.biorockbali.webs.com)

**Karin and Dray work as managers for Bali Diving Academy, a major contributor to the Biorock project. Twice a week Karin gives a presentation in the dive center about the Biorock project. 🐠**





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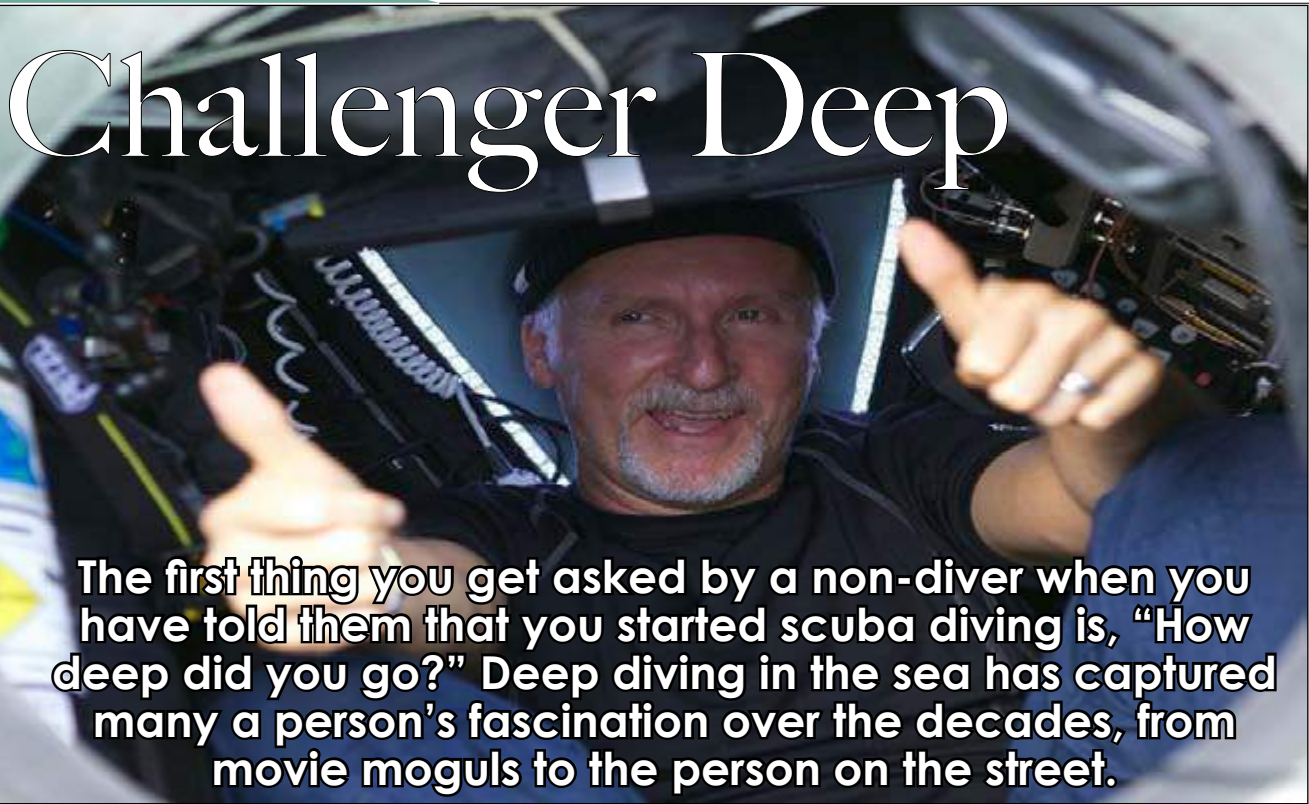
**DIVE &  
DISCOVER**



Photo: "Blinded By The Light" By Matthew Shepherd  
Picture Courtesy : Underwater Festival™



# Challenger Deep



The first thing you get asked by a non-diver when you have told them that you started scuba diving is, “How deep did you go?” Deep diving in the sea has captured many a person’s fascination over the decades, from movie moguls to the person on the street.

James Cameron became an instant hero on March 26, 2012, when his submersible Deepsea Challenger came to rest at the bottom of the deepest part of the ocean, the Mariana Trench. This was in the Challenger Deep area which is in the southern part of the trench. The attempt was part of Deepsea Challenge, a joint scientific expedition by Cameron, National Geographic and Rolex to conduct deep ocean research and exploration. Cameron is the only individual ever to complete the dive in a solo vehicle and the first person since 1960 to reach the very bottom of the world in a manned submersible at 10,897m. The trip took him 2 hours and 36 minutes.

We know James Cameron better for his movies Avatar and Titanic – to name but two – his works are not only fiction though and he has produced and directed some documentaries as well. Always nail-biting and made with the newest technology, Cameron’s movies never disappoint, and the latest one in the making with footage from this trip is sure to be a blockbuster. He is no stranger to underwater filming and while working on Titanic he took 12 submersible dives to the famed shipwreck two-and-a-half miles down in the North Atlantic. Since then he has led six expeditions, authored a forensic study of the Bismarck wreck site and done extensive 3D imaging of deep hydrothermal vents along the Mid-Atlantic Ridge, the East Pacific Rise and the Sea

of Cortez.

Building of this type of craft was seven years in the making and is an incredible engineering accomplishment. Unlike other crafts used in ocean exploration, which propel horizontally and are cylindrical in shape, this one is built to operate vertically. The inner chamber is made of thin steel and is spherical to give it the strength it needs to withstand pressures of up to 1 101 bar. It is so small that Cameron could not extend his arms fully when seated – the rest of the 7m hull was made up of special pressure-resistant glass foam, which also provided buoyancy. The foam is so strong that the thrusters and batteries of the submersible were mounted directly into the foam, with no need for a steel superstructure to support them.

The craft is a showcase of engineering innovation built to travel to the hadal zone – the deepest part of the ocean. Above all, it is designed for safety – every critical function has multiple backup systems, from human life support to power, communications and the mechanisms for ascent to the surface.

The previous attempt to reach the bottom of the oceans, by a manned submersible, was on January 23, 1960 by Navy Lt. Don Walsh and Swiss oceanographer Jacques Piccard in the bathyscaphe Trieste. They spent

only 20 minutes on the ocean floor before returning to the surface. Walsh was a consultant on the Deepsea Challenge and was aboard the Mermaid Sapphire expedition ship during Cameron’s attempt.

In 1960, an experimental Rolex Deep Sea Special watch was strapped to the hull of the Trieste and emerged in perfect working order after withstanding the huge pressure exerted. The Deepsea Challenger submersible carried a new, experimental wristwatch; the Rolex Deepsea Challenge, attached to the manipulator arm, renewing the pioneering engineering challenge the Swiss watchmaker took up 52 years ago.

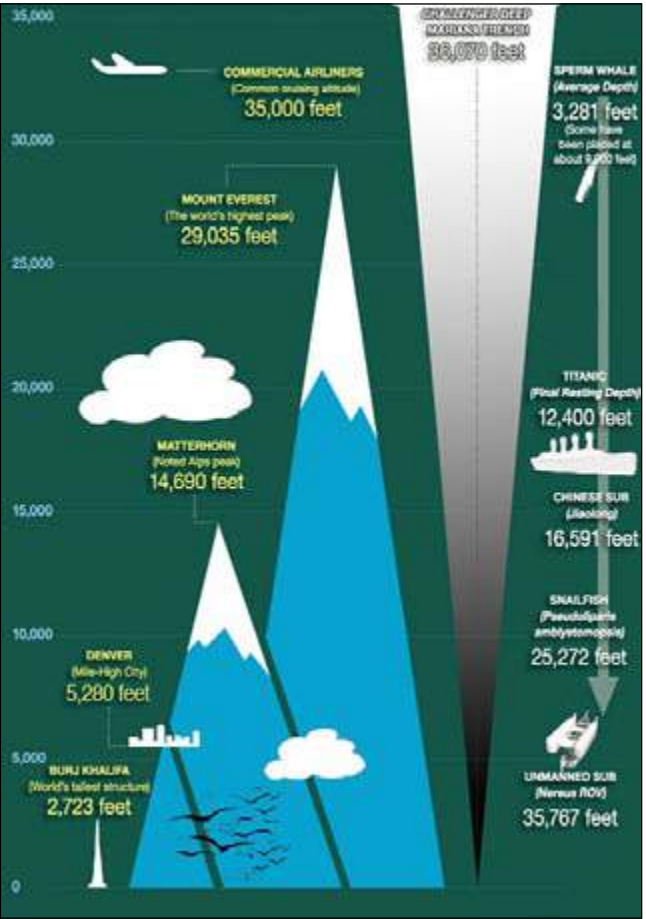
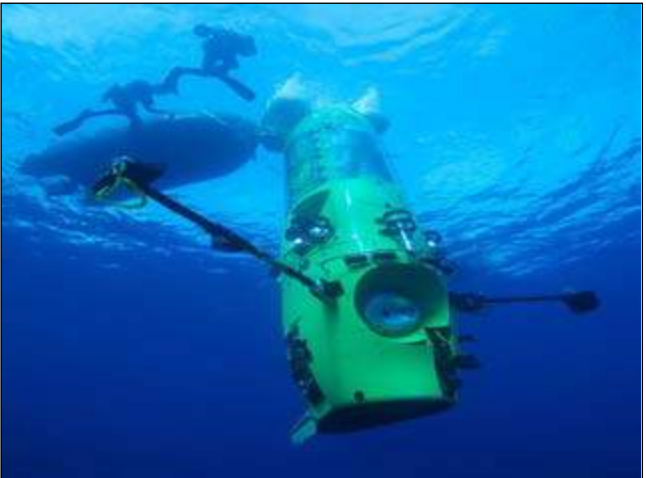
On this trip, Cameron collected samples for research in marine biology, microbiology, astrobiology, marine geology and geophysics, and captured photographs as well as visually documenting the trench in 3D format. A few of their objectives was:

- To create and operate a vehicle that can carry a human pilot to the deepest sites in earth’s oceans and perform work with significant bottom time for research activities.
- To demonstrate the ability to dive repeatedly at any given site to gather data, samples and imagery to create a comprehensive data set.
- To bring back compelling imagery in 3D of never before seen geological processes and species. This will inspire public interest in exploration and in scientific study of the deep ocean, especially among young people who must become our future scientists, engineers and explorers.

The craft had new specially built imagery equipment including eight HD and 3D cameras. They were built with new ways of imaging through an ultra-small, full ocean depth-rated stereoscopic camera lenses. The Deepsea Challenger was also equipped with a hydraulic manipulator arm that can pick up rocks and animals on the ocean floor. Two unmanned vehicles called landers were also dropped into the trench—they contain cameras, along with baited plastic traps that will collect creatures and water from the ocean bottom.

A lot of the equipment was specially made for this project. From the circuit breakers – more than 1 500 of them – to the battery housings, the special LED light ‘bricks’, the foam for the outer capsule, the thrusters, the way the sub maneuvers and uses it ballast, are all new designs tweaked to perfection. And although there are still small problems being sorted out with every dive, this is truly a marvel of design. Even before the mission began, Cameron and his team had caught the attention of scientists, engineers and commoners.

To hit rock bottom has a new meaning now. Cameron and the Deepsea Challenge team are dedicated to advancing the world’s understanding of our ocean’s vast range of biological and geological phenomena. “Imagination feeds exploration,” he says. “You have to imagine the possible before you can go and do it.” To read more about the expedition, the sub and the science, visit [deepseachallenge.com](http://deepseachallenge.com)





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# A potentially life ending risk with oxygen



In the early days of nitrox teaching, you may remember the concept of the 'best mix' being presented? The idea that in order to maximise your benefit from diving nitrox ( longest no stop times or smallest amount of decompression to be done ) you dived the highest partial pressure of oxygen possible, and therefore the lowest amount of nitrogen in the breathing gas. A simple premise which often lead to dive plans with anything up to 1.6 ata PO<sub>2</sub>'s with the intent of gaining a few more minutes of no stop time.

Some technical divers still carry this concept with them even now, deliberately pushing all bottom gases to their limits of 1.4 ata or even beyond with the same reasoning - more oxygen = less inert gas = less decompression time. Here we'll take a look at why this logic could be considered both unwise and flawed.

One area is simple to grasp, the risks involved in CNS oxygen toxicity occurring in water. Technical dives can be long, can be hard work, and more or less mandate the use of high partial pressures during ascent and decompression.

Oxygen at 6m for example. A diver who has run a high bottom partial



pressure will be arriving at his decompression switch points with a higher accumulated exposure and subsequently an increased risk of toxicity at this point in the dive ( that it's true, could conceivably happen on even a low bottom PO<sub>2</sub> dive if the wrong set of circumstances came together ). At least at this point in the profile a diver going symptomatic can switch to a lower gas, and a recovery/rescue effort stands good chance of success.

Much worse case than this would be a diver running high bottom PO<sub>2</sub> who began to experience symptoms at depth. Down here there is no relief to a lower oxygen gas. In an overhead environment with no immediate shallow access, or with significant decompression in place, this will likely be a non-recoverable situation.

In the light of the above we have to evaluate whether taking a potentially life ending risk with oxygen is worth it for the perceived saving of literally a few minutes of decompression time. Answer, no.

Beyond toxicity issues there is a less obvious consideration concerning actual offgassing. Oxygen is a pulmonary vasodilator and peripheral vasoconstrictor. In normal life this allows good transfer of gas from lungs to bloodstream but stops unnecessary delivery to other tissues that already have enough O<sub>2</sub>.

At higher partial pressure though, things start to change. Blood vessels in the lungs open more than normal,





fluid pressures increase, inflammation occurs, fluids accumulate in the alveoli and membranes thicken. Pulmonary toxicity in other words, greatly slows gas exchange. In peripheral tissues the high PO<sub>2</sub> starts to constrict blood vessels, vessels that were open early in the dive ( onassing phase ) now shut down and inhibit offgassing of the surrounding tissue. These processes worsen over time and reverse only slowly.

The way to avoid this ( especially long or multiple dive scenarios ) is to keep bottom PO<sub>2</sub>'s low, in the 1.2 ata or less range seems prudent, thereby keeping these effects at bay and allowing you to arrive at your decompression with your body still in a condition to actually offgas.

You need the higher partials now to decompress effectively with, and while deco gases will also naturally cause your pulmonary and circulatory effectiveness to shut down, the time taken for this to occur can be greatly extended by cycling on and off of high gases ( "air breaks " ).

In summary then, we find the 'Best Mix' idea adding needless risk of CNS toxicity, whilst at the same time physiologically hindering the decompression that it was originally perceived to be reducing.

Keep your dive gas oxygen low and you can't hurt yourself whilst down there, with the bonus of being able to decompress cleaner and safer later on. Safe and simple. ▣





## Q &amp; A

## Should dive masters and instructors rather have technical experience or solo diving experience?

Nuno Gomes



We all know the saying, "dive alone, die alone". It is a well known fact that diving alone is much riskier than diving with a buddy. There are situations from which one cannot perform a self rescue, even with all the redundancy available, such as that used in technical diving. It is also a fact that sooner or later one will dive alone, not by choice but simply because one's buddy will become separated for one or the other reason. One

should be prepared for that situation and not panic. The only way to avoid panic is to be familiar with a certain situation by way of practice. Instructors and dive masters will find it very useful to be prepared for the diving alone situation. In many cases they will be diving with many students upon which they cannot rely on to save them in an emergency. As far technical experience is concerned, knowledge cannot do a dive master or an instructor any harm. The more that the instructor knows the better. Knowledge related to nitrox and recompression chamber theory will be of great use above skills such as rescue and oxygen administration. ■

Barry Coleman



There is not an Instructor or dive master who can say they have not done any 'solo' diving. Simply able to see your buddy is not enough. Can you reach your buddy without a single breath in your lungs, do you have back up equipment? Does technical diving prepare you for the possible consequences of 'solo' diving? Some may say so and others not, it has to do more with the frame of mind and how you react under real pressure and nobody knows this until it happens! Time in the water, training and back-up equipment is a help but no guarantee that you can focus your mind to react where only a few minutes may mean life or death. ■

Pieter Smith



Solo diving is an option only for specific reasons or applications. In general it is not correct to justify solo diving. It is also not justifiable for specific levels of diving but rather for specific conditions or reasons, and then only limited to that. Practise solo diving can be done on most dives whereas one can discuss and plan it as part of the dive planning. Technical

diving is in essence solo diving as help from your dive partner is very limited in most cases. Solo diving must rather be expressed as a competent diver being able to dive on his/her own but within a dive group by being able to handle almost all potential situations. ■

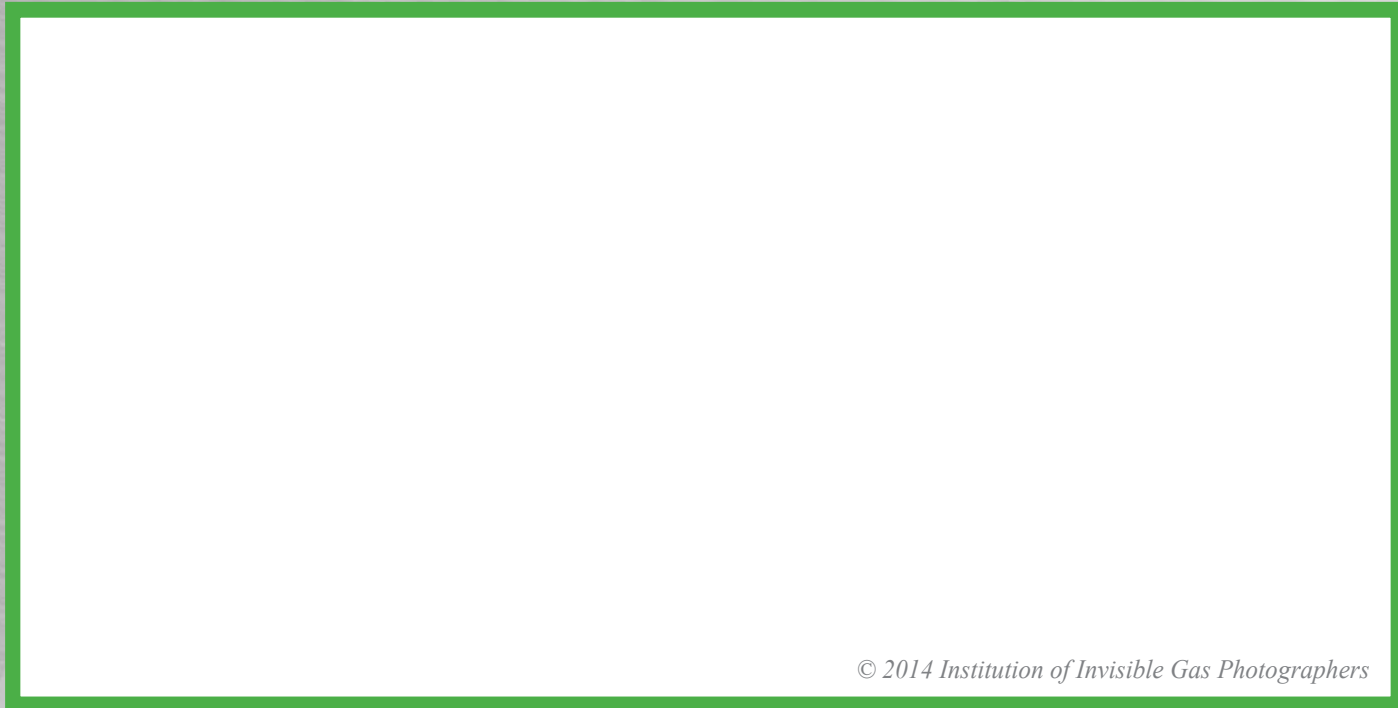
Pieter Venter



I do not think that dive masters or instructors need any technical training or experience if they do not accompany technical divers or students. I do not see how technical dive training could help with any situation the good dive masters and dive instructors cannot deal with courtesy of their current training. The focus of sport diving professionals is to train or accompany sport divers on a safe and fun dive and to be able to deal with any emergency which may arise from such a dive. Additional training in the curriculum will detract from the main focus, and unless the technical aspects are regularly practiced, it will make no positive contribution. Unless the sport dive professional is interested in taking up and practicing technical diving, I would not recommend it as a requirement for his profession. Although solo diving can be necessary for certain technical or cave dive situations, I also do not see the benefit of teaching or promoting a dangerous activity, which will not contribute to the skills needed for a dive master or instructor for sport diving. Solo diving should only be practiced if it is required for a specific task. The old saying still holds - "to dive alone is to die alone". ■



# NITROX IT'S A GAS



© 2014 Institution of Invisible Gas Photographers

PICTURE OF NITROX IN ACTION, TAKEN WITH WIDE ANGLE LENS

## START YOUR COURSE ONLINE TODAY!

There was a time when the use of NITROX was viewed as extreme by many in the recreational dive world. Now it is fast becoming the gas of choice for mainstream diving and is available for all divers. Like so many changes to the industry it is driven by the top echelon of the technical diving community. That's one of the things that makes RAID different, the owners are real divers and in fact two of the directors are considered among the best technical divers in the world (see their profiles below). That means RAID training programs are at the cutting edge and in a class all of their own.

So what is NITROX and how does it work? It is essentially oxygen enriched air, it has many benefits over the use of traditional air, including potentially longer bottom times, less risk of decompression sickness and many people report increased energy levels. That's why all RAID dive centres actively promote the use of NITROX.



### Paul Toomer

Paul is a force of nature in the diving world and his unique approach to training is legendary. Paul has reached the pinnacle of the world's leading diver training agencies writing the technical programs for a major training agency before becoming a partner in RAID. He is a sort after speaker at technical events and dive shows around the world and an expert in all facets of technical and rebreather diving. Paul is the International Training Director for RAID.



### Barry Coleman

Barry is a pioneer in technical diving. Barry conceptualised the design of the world's first recreational rebreather and working closely with the design team at Poseidon, the Mk VI Discovery Rebreather was born. To support the diver training required for Mk VI, Barry wrote the initial training program which ultimately became RAID dive training, clearly demonstrating the power of adapting traditional technical products and training to the recreational market.

[www.diveRAID.com](http://www.diveRAID.com)



## An Introduction to Diving with NITROX

**Want to Dive on NITROX? - This may be a familiar question**

So what exactly is **NITROX** and how may it be of benefit to me diving?

Contrary to what many people believe, NITROX is not a deep-diving gas mixture.

In the SCUBA diving community NITROX refers to any SCUBA diving gas mixture composed of nitrogen less than 78% and oxygen greater than 22% and less than 40%. The trace gases are ignored. As you can see from the picture above, NITROX is a colourless and odourless gas and is available for all divers.

NITROX will extend your allowable no decompression limits or bottom time. It does this simply by reducing the amount of Nitrogen gas you are exposed to under pressure.

These benefits do of course have conditions associated with them and like everything can be abused. You will learn about these conditions and how to safely dive whilst breathing NITROX in RAID's NITROX course.

NITROX is known by many names: Enriched Air NITROX, Oxygen Enriched Air, NITROX, EANx or Safe Air.

If you see "NITROX32" or "NITROX36", the number is referring to the percentage of oxygen content in the gas mixture and in turn the diving cylinder you are using.

So "NITROX32" or "EANx32" or "Oxygen Enriched Air 32" contains 68% nitrogen and 32% oxygen. "EANx36" contains 64% nitrogen and 36% oxygen etc...

The two most popular blends are EANx32 and EANx36, developed by NOAA for scientific diving, and also named NITROX I and NITROX II, respectively.

It is very important that you check the gas mixture in your cylinder before each dive, because you need to know what mixture you have for calculating your dive times and to find out the maximum depth you can dive. You will learn how to do this in your RAID NITROX course.

Oxygen is toxic at depth for us humans! Yes the increased pressure at depth will increase the partial pressure of oxygen (PpO2) and this increased pressure can become toxic. With NITROX diving we have to stay within two limits, the NDL limit which as a diver you already know about and the other is the oxygen toxicity limits. Staying within these

two limits will allow you to dive underwater longer than an equivalent AIR diver at the same depth and more often than an AIR diver to the same depths.

It is all about balance!

When you complete your NITROX course you find how NITROX will be of benefit to you. You will use it as a means to help you diving, not as a macho status!

For example if you are planning 3 or 4 dives a day whilst on holiday then use NITROX, because of the benefits, but if you are doing one dive in the day to a shallow depth, there is little need for NITROX. This is a generalisation, and there are always reasons for and against. The important issue is to understand it and plan for using NITROX if it will be of benefit which you will learn more about on your course.

### History

NITROX gas mixture is nothing new and has been in use under differing names since before the Second World War.

The history and development is well known and risks associated with well documented. NOAA is perhaps the best known authority and has developed tables and working parameters that are still in use and followed today.

### Myths



- NITROX does not remove the risk of decompression sickness.
- NITROX does not remove the risk of pressure related injuries.
- NITROX does not reduce Nitrogen Narcosis

The RAID NITROX Diver course is designed to introduce you to the procedures and skills to safely dive NITROX. There are many benefits of diving NITROX and the course will give you a good grounding in the use of gas mixtures other than pure air.

This course is also a grounding set of theory and skills that will help you through the rest of your RAID journey. All other levels above the RAID Open Water and NITROX courses have gas analysing and calculations embedded. This means the information and skills you learn in your RAID NITROX course are valuable through all your RAID training programs.

**Sign up for RAID's NITROX course today in just 3 easy steps.**



STEP 1 head to [www.diveRAID.com](http://www.diveRAID.com) and click the button REGISTER at the top right. Then complete the form and wait for an email from RAID. STEP 2 on receipt of your registration confirmation email, open and follow the instructions. Step 3 complete the forms. You are now registered! Once you have completed your online training successfully you will have a great understanding of diving with Nitrox. Your RAID Dive Centre can then complete your training and issue your certification, this may include diving on Nitrox. For more information contact RAID at [admin@diveRAID.com](mailto:admin@diveRAID.com) or call 02 4088 0560.



**Just like RAID there are loads of benefits to NITROX, the more you use it the more you'll see it.**



# Instructor Diaries

Why become an instructor?

Usually when people start off participating in scuba diving, the last thing on their mind is becoming a diving instructor. As they progress through the echelon of the dive world, some feel the need to reach a level where they can start training people and share the incredible world of scuba diving.

The road to becoming an instructor is not a difficult one, but does require focus, commitment and passion, not only during the journey to becoming an instructor but well after the qualification has been achieved.

If you decide that the instructing route is one you want to explore, please ensure that you choose your instructor trainer well. Remember that your current instructor may not be at a level where he or she can train you to become an instructor. Instructor trainers have different qualifications and are well versed in the underwater world to equip the new instructor student with the best knowledge and experience. Therefore, make sure you choose your instructor trainer well, after all, you don't know what you haven't been taught.

So why would you want to become an instructor? I find that usually it's the passion for scuba diving that drives people to go all the way to instructor, and when they do finally arrive it's amazing to see the change in attitude and self confidence. Some remain humble and focused on their students, delivering an incredible service – they give it all and nothing is an effort. On the flip side you do get instructors who think they are the 'business' and they know basically everything. All I can say is be

very aware of these instructors they usually don't have a clue about anything except blowing their own horns.

To become an instructor means a lot of responsibility towards the diving community and to your students. You must keep your knowledge up to date with changes in the scuba environment as well as possible changes in your organisation's policies and procedures.

Once an instructor level has been achieved, some instructors are more than happy to remain at that level, but you do get instructors moving into other areas of scuba diving, such as technical diving. Technical diving offers the instructor a much broader knowledge base and enhances diving ability and skill incredibly. I would suggest that all current instructors look up a technical instructor and have a chat about what this sphere of diving can offer.

In conclusion, I want to encourage divers with a real passion for diving to consider becoming an instructor – the dive industry always needs good quality instructors. This will give students more choice so that eventually only the best instructors remain in the industry and the weaker, arrogant ones are worked out. ■





# Equipment to hire or not to hire :

This is a question that each diver will eventually face – do you take the plunge and buy all of your own kit or continue hiring what you don't own as and when you need to?

## Advantages of buying

- You can customise your kit to suit your needs and keep setups that work for you.
- Familiarity of your kit is key to confident and safe diving.
- Availability – if you decide to dive one fine morning, you can do so without a trip to the dive shop or hope that the dive site will have kit for you.
- Safety – the condition of your kit will be your own responsibility, so if you look after it you will be sure that it will look after you.

## Disadvantages of buying

- Initially, it can be expensive depending on what you buy.
- Extra space is taken up by kit when travelling long distances.

- Maintenance of the kit can be costly, such as servicing DV's.

## Advantages of hiring

- Booking in advance will ensure that you have equipment ready at your destination without having to transport it.
- Maintenance and servicing the equipment are not your problem.

## Disadvantages of hiring

- Price – some places don't always play the game, some going as far as charging per hour for equipment hire.
- Condition – some of the equipment being hired out is in a shocking condition. Fortunately this is the exception rather than the rule.






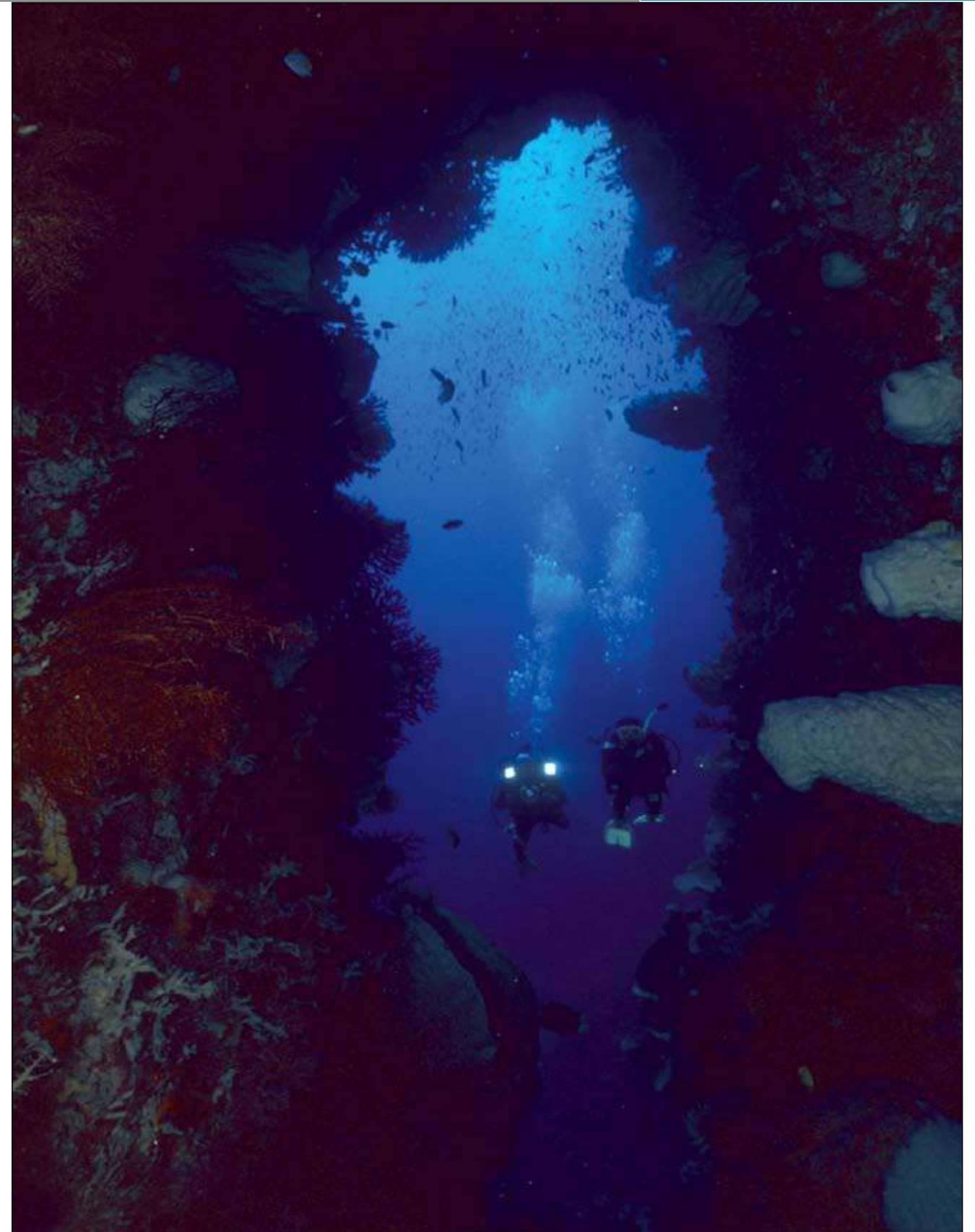
• Sizes – due to availability you might sometimes have to settle for what you can get, and that may mean not always fitting as well as you would like.

### Tips on hiring equipment

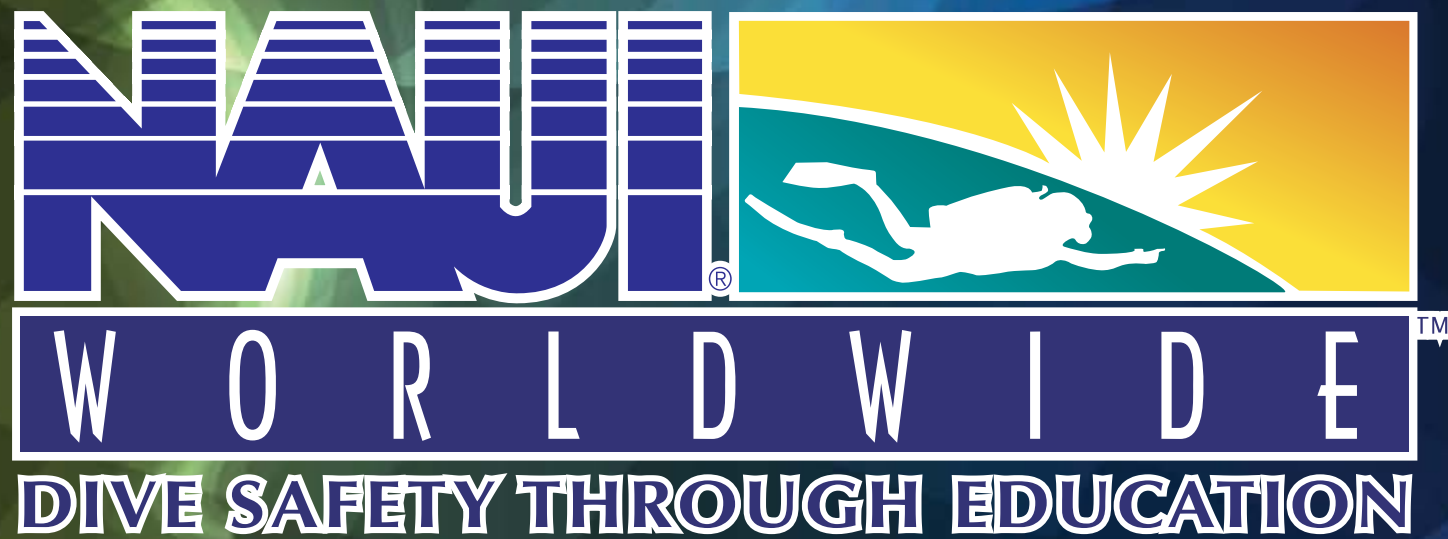
- Always book well in advance, especially when there is a holiday or long weekend.
- Try and hire from the same place – someone whose equipment you have learned to trust.
- Always insists on fully kitting the regulators to the cylinder and the power inflator to the BC before taking the equipment from the shop. Check for leaks and the like.
- Check the condition of the hoses – if

there is even a hint of perishing don't take the equipment as the chance of failure is good.

- Complain – if you are not satisfied with what you are paying for you are not obliged to just take it. When hiring, you expect perfectly functioning equipment – it is the operator's responsibility to provide the equipment in this condition.
- “It should be fine” just doesn't cut it. If you are told this by someone you are hiring equipment from, it means they are not sure.
- Look after the equipment when using it (treat it as if it were your own), and return it in the same condition that you received it – rinsed, and if time allows, dried. 







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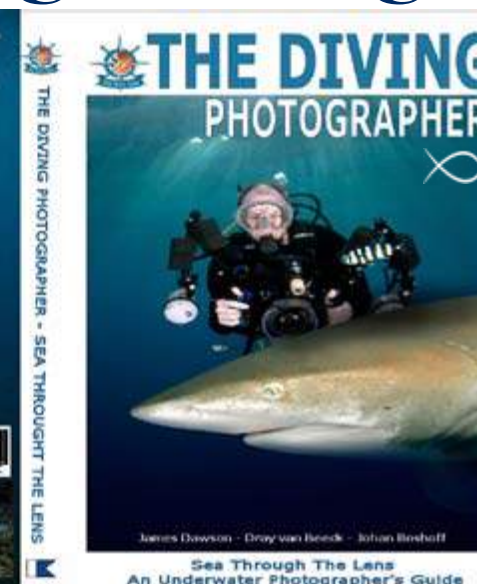
# The Dive Spots of Western Australia

The Dive Spots of Western Australia is an indispensable guide for all levels of divers and snorkelers, broadening their horizons on places to visit and dive/snorkel in Western Australia. The book has more than 175 dive spots in Western Australia. Important guidelines on each coastal dive destination include accommodation, facilities, travelling tips and dive conditions. Complete with photographs and more than 100 illustrated maps of each dive site, all reefs are star rated to cover depths, marine life and other essential information for the diving and snorkelling community.

For more information visit [www.thedivespot.com.au](http://www.thedivespot.com.au)



# The Diving Photographer –



As scuba divers, we are not always the best photographers, but we do learn very quickly. And if we have a handy guide book, the time spent with our cameras underwater will increase rapidly.

This easy-to-use guide book for the diving photographer can be used by all levels of photographers. It helps you with choosing the right type of camera for your ability – although with all the information presented you will learn so quickly that you will have to buy a better camera after working through

the book! Preparing and setting up your equipment becomes a breeze with easy pointers on how to check and replace o-rings, quick tips on keeping your housing dry and other small things we usually forget to check.

The technical advice on how to perform manual camera settings, lighting techniques and editing the not-so-perfect shot was a great help. One of the main things I took from this book was learning to back up my photographs and then trying anything and everything with them in the photo editing programmes until it looks like the professionally taken shot that you have been aiming for the whole time. Some other topics covered are strobe positioning, ambient light, photographing wrecks, long exposures and equipment maintenance.

I must say that this book has proved to be a great help in improving my photographing and editing techniques. Watch out Sodwana Shootout, here I come!

The Diving Photographer is available in all good scuba diving and book shops or online at [www.thedivespot.com.au](http://www.thedivespot.com.au). Cost: \$20



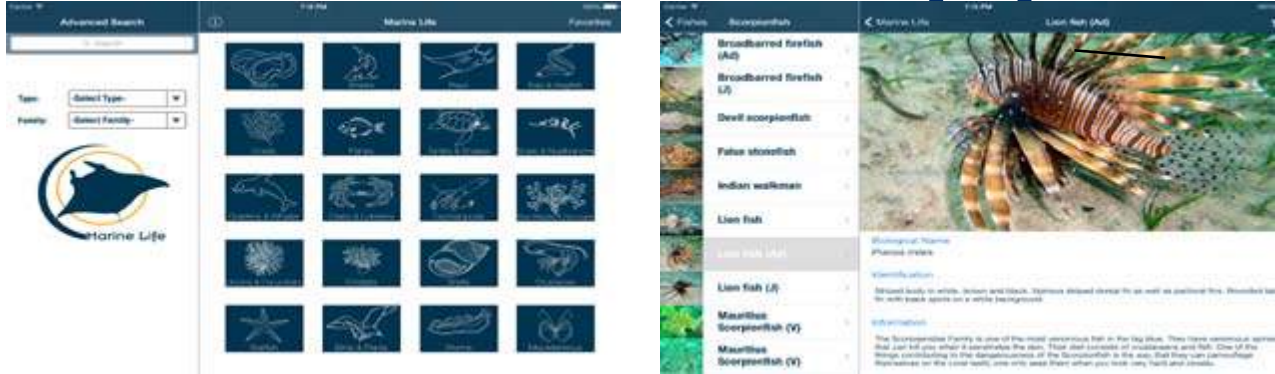
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# Marine Life app

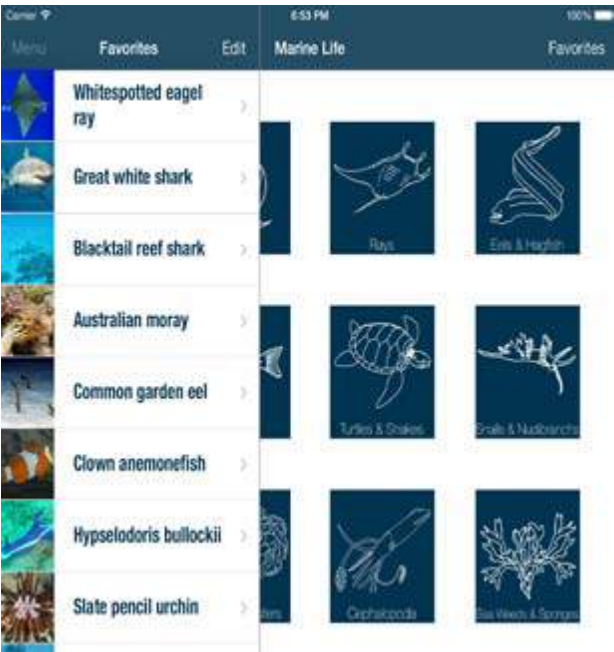


A user friendly app designed to assist divers with marine life identification and at the same time learn more about the fascinating lives of our ocean dwellers.

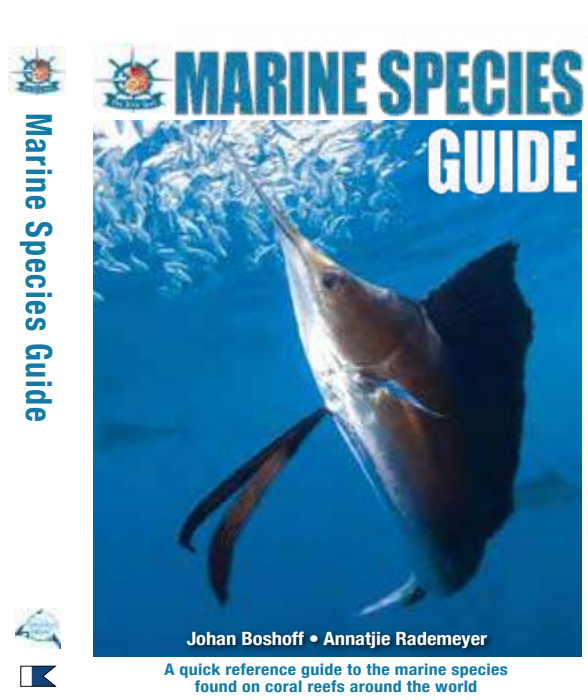
Learn about your favourite sea animals at the swipe of a finger, with more than 4000 full colour photographs of sharks, rays, eels, nudibranchs, hagfish, snails, crabs, lobsters, sea weeds, sponges, cineraria, turtles, snakes, dolphins, whales, worms, crustaceans, shells, cephalopodan, urchins, sea cucumbers, starfish, birds and many more. Displays information such as common names, aliases, biological names, identification, families, gender, size, life stag and much more.

A leader in marine life identification and used in education programs all over the world, now available to you from Apple App Store for only \$6.

<http://AppStore.com/marinelifemarinespeciesguide>



# Marine Species Guide –



Yes, it happened...I had to buy a larger bookshelf. The latest book from The Dive Spot has landed on our shores – The Marine Species Guide.

A book for both scuba divers and snorkelers to identify and learn all about the different fish species they will come across under water. The book covers most of the marine species found within coral reefs around the world. Line drawings of fish families simplifies identification underwater, while general behaviour of the family along with other interesting facts are listed.

Information include common family names, aliases, biological family names, size, identification, general information, feeding preferences and where the families occur around the globe. Photographs of the most common of the species found when scuba diving or snorkeling are included and the fish families are organised for easy reference.

The book works very well in accompaniment with the Marine Species Slate, which can be taken underwater to help with fish identification.

To buy your copy for \$ 22, visit [www.thedivespot.com.au](http://www.thedivespot.com.au) or email [info@thedivespot.com.au](mailto:info@thedivespot.com.au)





Seeking diver  
Young attractive male seeks female dive buddy for shared recreation and friendship. Must have boat. Please send photo of boat. [K]

~\*~

SSI vs. NAUI vs. PADI  
Three instructors and their students are on board a dive boat in the middle of the ocean. There is a NAUI instructor, a PADI instructor, and an SSI instructor. Everything is going fine until the boat springs a leak and starts to sink. The SSI instructor says to his students, "Okay, we're in the middle of the ocean, so we might as well do our deep dive." The NAUI instructor says to his students, "Okay, we might as well do our navigation dive, so let's get our compasses out and swim towards shore." The PADI instructor says to his students, "Okay, for \$100 extra you guys get to do a wreck dive!" [K]

~\*~

Why go diving with your buddy?  
My scuba instructor always stressed that you should never go diving alone. If you have equipment problems, your buddy can help you. If you run out of air, your buddy can help you. If you meet an aggressive shark, your odds are 50-50 instead of 100%. [K]

~\*~

A decade without diving?  
A man is stranded on a desert island, all alone for ten years. One day, he sees a speck on the horizon. He thinks to himself, "It's not a ship." The speck gets a little closer and he thinks, "It's not a boat." The speck gets even closer and he thinks, "It's not a raft." Then, out of the surf comes a gorgeous blonde woman. She walks up to the man and she says, "How long has it been since you've had a cigarette?" "Ten years!" he says. She reaches over, unzips a waterproof pocket on her left sleeve and pulls out a pack of fresh cigarettes. He takes one, lights it, takes a long drag and says, "Man, oh man! That is good!" Then she asked, "How long has it been since you had a drink of whiskey? He replies, "Ten years!" She reaches over, unzips the waterproof pocket on her right sleeve, pulls out a flask and gives it to him. He takes a long swig and says, "Wow, that's fantastic!" Then she starts unzipping the long zipper that runs down the front of her wetsuit and she says to him, "And how long has it been since you had some real fun?" And the man cries out, "Don't tell me you've got dive gear in there, too!" [K]

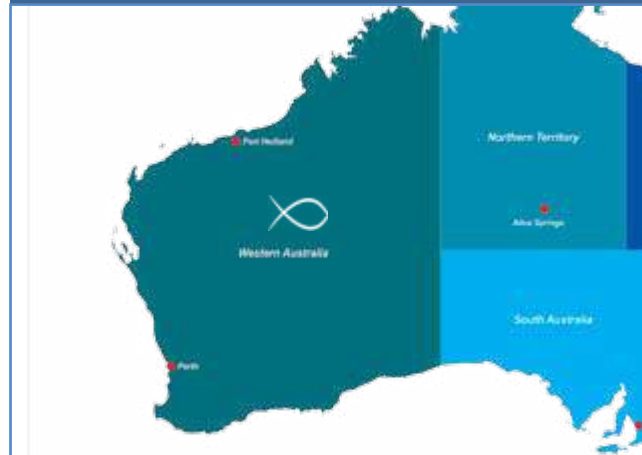


Send your funnies to  
[johan@ozdiver.com.au](mailto:johan@ozdiver.com.au)





## Western Australia



### Perth Region

#### The Dive Spot - South Perth



We specialise in a wide variety of dive related activities. Our scuba training range from beginners to the more advanced including specialities and professional courses.

**Phone:** +61 (0) 44 887 9903  
**Mail:** [info@thedivespot.com.au](mailto:info@thedivespot.com.au)  
**Web:** [www.thedivespot.com.au](http://www.thedivespot.com.au)

#### Astero Dive - Perth



We strive to provide excellent and safe training standards for anyone who want to learn to dive with us. We provide training from entry level through to Instructor Training.

**Phone:** +61 (0) 450 800 238  
**Mail:** [scubainstructor@iinet.net.au](mailto:scubainstructor@iinet.net.au)  
**Web:** [www.astegrodive.com.au](http://www.astegrodive.com.au)

#### Perth Scuba - Canning Vale



WA's largest dive shop, best range of snorkelling, free diving and scuba equipment. WA's PADI Career Development Centre offers courses from beginner to professional and TDI technical training. Perth Scuba has a free dive club offering twice weekly guided dives.

**Phone:** +61 (0) 8 9455 4448  
**Mail:** [info@perthscuba.com](mailto:info@perthscuba.com)  
**Web:** [www.perthscuba.com](http://www.perthscuba.com)

#### Perth Diving Academy - Hillarys



PDA Hillarys for all of your dive and snorkelling requirements local and friendly staff to help you make the right choices open 7 days come and see us down at the Hillarys Boat Harbour just north of the boat ramp see you there

**Phone:** +61 (0) 89 448 6343  
**Mail:** [troy@perthdiving.com.au](mailto:troy@perthdiving.com.au)  
**Web:** [www.perthdiving.com.au](http://www.perthdiving.com.au)

#### OZDiver Dive Group - Perth



We focus on scuba diving at all levels and explore locations. We welcome any qualification level of divers including snorkel divers wanting to learn more about diving, and get onto club diving events to meet likewise divers.

**Phone:** +61 (0) 450 800 238  
**Mail:** [izak@ozdiver.com.au](mailto:izak@ozdiver.com.au)  
**Web:** [www.ozdiver.com.au](http://www.ozdiver.com.au)

#### Scuba Imports & The DiveTub - Perth



Since 2007 to service the Australian Dive Industry with the best scuba equipment available. We offer high-end gear, including recreational, technical and commercial equipment. Wherever possible we'll price match any online dive store to ensure you get the best deal!

**Phone:** +61 (0) 8 92400163  
**Mail:** [info@scubaimports.com.au](mailto:info@scubaimports.com.au)  
**Web:** [www.scubaimports.com.au](http://www.scubaimports.com.au)

#### Dolphin Scuba Diving - Welshpool



Perth's friendliest dive shop. Learn to dive in as little as 2 days! Small groups with a flexible schedule. Weekly. FREE Sunday Morning Shore. Providing Instructor training, Rebreather courses and support. Technical diving tuition and trips. Local and international diving holidays.

**Phone:** +61 (0) 8 9353 2488  
**Mail:** [dolphin@dolphinscuba.com.au](mailto:dolphin@dolphinscuba.com.au)  
**Web:** [www.dolphinscuba.com.au](http://www.dolphinscuba.com.au)

#### Scubanaautics Diving Academy - Rockingham



Welcome to Scubanaautics, where customer service and satisfaction is our main goal. Drop in to say hello, our friendly staff are happy to help. Check out our new "online Store"

**Phone:** +61 (0) 8 9527 4447  
**Mail:** [info@scubanaautics.com.au](mailto:info@scubanaautics.com.au)  
**Web:** [www.scubanaautics.com.au](http://www.scubanaautics.com.au)

#### Wizbang Diving Solutions - Perth



Technical Training for divers. The development of safe and technically competent divers through specialized training. Rebreathers, Mixed Gas or even just Nitrox, we will help you develop the skills and confidence that will carry you into a safe and enjoyable future.

**Phone:** +61 (0) 41 876 1727  
**Mail:** [diving@wizbang.com.au](mailto:diving@wizbang.com.au)  
**Web:** [www.wizbang.com.au](http://www.wizbang.com.au)

#### Western Blue Dive Charters - Mindarie



We are the only dive company north of Fremantle that operates seven days offering double dive charters, returning before lunch, and allowing you to catch crayfish if you wish. Being a small company we offer a personalised service at an affordable price

**Phone:** +61 (0) 40 954 5553  
**Mail:** [info@westernbluedive.com.au](mailto:info@westernbluedive.com.au)  
**Web:** [www.westernbluedive.com.au](http://www.westernbluedive.com.au)

### Geraldton

#### "A" Team Divers - Geraldton



A - Team Divers offers internationally recognized NAUI and SSI scuba diving courses. Small groups ensure personal attention during your training. We also have an active social club for after course adventures!

**Phone:** +61 (0) 45 828 5497  
**Mail:** [geoff@ateamdivers.com](mailto:geoff@ateamdivers.com)  
**Web:** [www.ateamdivers.com](http://www.ateamdivers.com)





## Dive Operators

Australia

### Bunbury

#### Octopus Garden Dive Charters



Just 1.5 hours south of Perth is Bunbury, home of the Lena Dive Wreck (18 metres) & abundant local & coral reef (0-33 metres), including "Blade Coral"—photographers paradise. Small groups –experienced & personalised service. Comfortable, enclosed diesel powered vessel.

**Phone:** +61 (0) 43 892 5011

**Mail:** kimroyce@gateway.net.au

**Web:** www.octopusgardendivecharters.com.au

### Exmouth

#### Dive Ningaloo - Exmouth



Dive Ningaloo pride themselves in taking small groups to only the best dives on the Ningaloo Reef, Murion Islands and more. All courses welcome. With over 20 years experience diving in the Ningaloo, we know where the best diving is!

**Phone:** +61 (0) 4 567 02437

**Mail:** info@diveningaloo.com.au

**Web:** www.diveningaloo.com

#### Snorkel Ningaloo - Exmouth



Take your snorkeling experience to a new level! Using your own Seadoo underwater scooter, you'll be propelled effortlessly through the beautiful Ningaloo, where you'll see the tropical fish and coral that makes Ningaloo one of the world's top snorkeling destinations.

**Phone:** +61 (0) 45 670 2437

**Mail:** info@snorkelningaloo.com.au

**Web:** www.snorkelningaloo.com.au

## South Australia



### Port Lincoln

#### Calypso Star Charters - Port Lincoln



PDA Hillarys for all of your dive and snorkelling requirements local and friendly staff to help you make the right choices open 7 days come and see us down at the Hillarys Boat Harbour just north of the boat ramp see you there

**Phone:** +61 (0) 86 82 3939

**Mail:** info@sharkcagediving.com.au

**Web:** www.sharkcagediving.com.au

#### ND Scuba - McLaren Vale



We are a small business that go above and beyond .we pride ourselves on providing safe and fun-filled courses at affordable prices. You get trained on a more personal level through to one on one, or small group tuition.

**Phone:** +61 (0) 88 323 8275

**Mail:** barrettn80@hotmail.com

**Web:** www.nbscuba.com.au

## Victoria



### Geelong

#### Australian Diving Instruction



Australian Diving Instruction is a PADI 5 Star IDC facility Offering everything for the Diver from Learn to Scuba Dive to Instructor including PADI Tec 40,45,50, Equipment Sales and Service National and International Dive Trips and Dive Holidays also Dive Charter Boat.

**Phone:** +61 (0) 40 836 5216

**Mail:** adigeelong@optusnet.com.au

**Web:** www.ausdivinginstruction.com.au

#### Bay City Scuba



Bay City Scuba is Geelong's premier dive shop. Offering all levels of training from Freediving through to Technical training and offering a huge selection of equipment to your diving needs. A RAID training facility offering extensive technical OC & CC rebreather training.

**Phone:** +61 (0) 35 248 1488

**Mail:** info@baycityscuba.com

**Web:** www.baycityscuba.com

### Rye

#### The Scuba Doctor Australia



The Scuba Doctor is an online and in-store dive shop stocked with quality brand recreational, technical and commercial diving products.

Low prices on scuba, spearfishing, freediving, snorkelling and watersports equipment, plus Air, Nitrox and Trimix fills.

**Phone:** +61 (0) 3 5985 1700

**Mail:** diveshop@scubadoctor.com.au

**Web:** www.scubadoctor.com.au

## New South Wales



### Killarney Vale

#### Pro-Dive Central Coast



Located between Sydney and Newcastle with daily boat dives to the ex-HMAS Adelaide artificial reef, only minutes from the local boat ramp. Online booking and dive sales available 24/7. PADI Instructor programs available.

**Phone:** +61 (0) 2 4389 3483

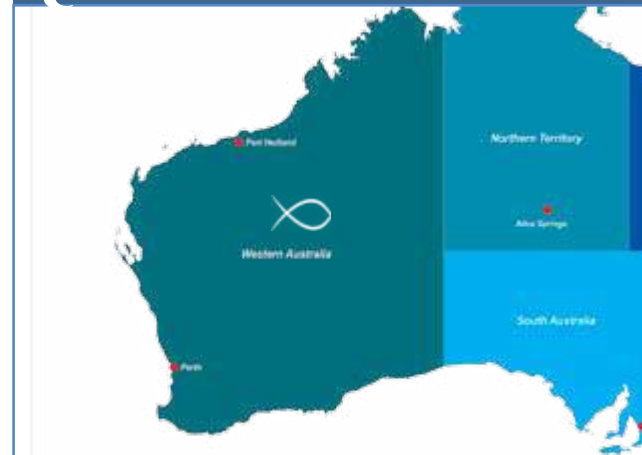
**Mail:** info@prodivcentralcoast.com.au

**Web:** www.prodivcentralcoast.com.au





## Queensland



### Sunshine Coast

Sunreef Mooloolaba- Sunshine Coast



Sunreef Mooloolaba offers the ultimate water experiences on Queensland's Sunshine Coast. From diving the HMAS Brisbane and local reefs, to Swimming with Humpback Whales from July to November, to stand up paddle boarding, kayaking and bubblemaker kids programs.

Phone: +61 (0) 7 5444 5656

Mail: [dive@sunreef.com.au](mailto:dive@sunreef.com.au)

Web: [www.sunreef.com.au](http://www.sunreef.com.au)

### Brisbane

Ozaquatec- Brisbane



Brisbane's largest dedicated scuba service centre, Ozaquatec has all of your servicing needs in one place at competitive rates. Our fast, friendly and professional customer service gives you, the diver, complete peace of mind.

Phone: +61 (0) 404 043 869

Mail: [admin@ozaquatec.com](mailto:admin@ozaquatec.com)

Web: [www.ozaquatec.com](http://www.ozaquatec.com)

## Gold Coast

Devocean Dive- Gold Coast



Devocean Dive is South East QLD's Premier PADI 5 star Instructor Development Centre. We offer unsurpassed service in a safe, fun environment with qualified, experienced Instructors. We look forward helping you achieve your SCUBA diving goals.

Phone: +61 (0) 75 528 0655

Mail: [admin@devoceandive.com](mailto:admin@devoceandive.com)

Web: [www.devoceandive.com](http://www.devoceandive.com)

## Brisbane

Tech Dive Academy- Port Douglas



You deserve the multi-award winning service of the ORIGINAL bespoke private diver training company - Serving Port Douglas since 2003. First for Bespoke Diver Training, the Dive Centre offers all levels of Recreational and Technical Dive courses.

Phone: +61 (0) 422 016 517

Mail: [info@tech-dive-academy.com](mailto:info@tech-dive-academy.com)

Web: [www.tech-dive-academy.com](http://www.tech-dive-academy.com)

## Tasmania



### Bicheno

Bicheno Dive Centre



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Phone: +61 (0) 3 6375 1138

Mail: [bichenodivecentre@bigpond.com](mailto:bichenodivecentre@bigpond.com)

Web: [www.bichenodive.com](http://www.bichenodive.com)



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Peter Pinnock

