Edited by
Michael Menduno

Cave Diving & CCR Training

—The Issue of Bailout Gas

Text and photos
courtesy of Steve Lewis

Remember the first rule of scuba diving that you were taught in your basic open-water class? I believe it goes something like: "Keep breathing!" Simple advice and unarguably the best advice possible for *any* diver, not just those entering the sport for the first time.

For example, the same first rule is true for technical diving. Gas management 101 starts off by stating something like: "Always have a sufficient volume of appropriate gas to breathe throughout the whole dive!" More wordy—and there are other nuances to a gas plan such as having gas to share with your buddy—but the message to the tech crowd is essentially the same as it is to the new diver. And unless I've missed a memo somehow, that message applies to all technical divers without exception.

Given all that, what's difficult to understand, is why some folks seem to lose the plot when they strap on a rebreather… even more baffling is when they strap on a rebreather and then swim into a cave while seeming to ignore the primary directive… always have something to breathe.

You may already know about rebreathers, and you may also be a cave diver. But for those of you who are only one or the other—or neither—here is the Coles Notes version of your CCR cave class. A rebreather offers divers the ability to get a long, long way from fresh air without much effort. Unlike an open-circuit cave diver who generally has to carry many stage bottles of gas to extend her foray into the deepest regions of a cave, way back from the exit, a CCR diver *can* push many hundreds even thousands of meters without making any allowances at all.

Here's one reason why. On a rebreather, the exhaled gas is recycled and the carbon dioxide is removed by a little chemistry set carried in the unit's scrubber. Apart from a few litres of diluent gas used up now and again, all the gas that needs to be added regularly to "the loop" (the breathing gas going round and round in the unit) is the oxygen metabolized by the diver as she swims. A working average for this is about 1.5 litres per minute, and this does not significantly change with depth. In other words, a three-litre bottle charged to 200 bar with oxygen can last for up to 400 minutes.

What that means is that if we were to say that the average cave diver on an easy outing swims at a speed of between 15 to 20 meters a minute, that volume of oxygen could translate into more than 6,000 metres of distance round-trip!

Now here's the problem. Everything on that six kilo-meter journey might be fine as long as the diver's CCR continued to function as it should. But what if it did not?

Sense-check

OK, sense-check time. I have more than a few dives in caves on a rebreather and have yet to have my unit fail on me. I *have* run out of diluent during a dive—operator error because I was playing silly buggers—and I have had a couple of incidents that required me to take the initiative and fix something on the fly—operator error or intentional skills testing—but

What to do when things go pear-shaped…

ALEXANDER LUCAS / WIKIPEDIA COMMONS

the truth is that I have not had to bailout in earnest in a cave while diving a CCR. Put it down to luck or using a checklist before every dive, but my CCR cave dives have gone remarkably smoothly… thus far. I have probably jinxed myself now.

Bailout

Beginning CCR divers doing entry-level CCR programs are often taught that if *anything* goes wrong with their unit, they should bailout. In other words, switch to open-circuit and get the heck back to the surface and sort things out there. One might argue that with all the various options that a rebreather gives its operator, bailing out is not always the best option, and teaching users to react this way as a default does not take full advantage of a CCR's strong points. *But* for the sake of brevity here, let's assume that bailing out to an independent open-circuit gas is "best-practice" for a cave diver with a problem. It follows then that to be ready for a dive where things fall off the rails, a CCR cave diver needs to carry some bailout gas so that she always has a sufficient volume of appropriate gas to breathe throughout the whole dive. So far so good.

I have heard CCR divers talk about a technique called "Buddy Bailout" or "Team Bailout". This essentially means that each diver does not bother to carry the gas he or she would need to swim out of the cave from the furthest penetration point to the exit. They would perhaps carry half of the volume required, and will "get the rest" from their buddy. I am not sure how you feel about this, but it gives me the willies.

Here's an outline of another technique, which doesn't have an official name, but let's call it "sufficient volume bailout" for the time-being.

Dive buddies

When things go pear-shaped underwater and stuff hits the fan, the simple solutions are generally the most effective and safest. On occasion a solution involves or requires the help of a dive buddy. Technical diving is a team-oriented sport and when things go wrong on a technical dive—and everything is aligned perfectly—we have one or two buddies to help out. All this aside, we are also taught that a diver should be capable of finishing her dive on her own and that the safest team is built around individual members who are perfectly capable of self-rescue should the need arise. This becomes particularly true in an overhead environment, and in the vast majority of cases, self-rescue (perhaps under the watchful eye of a companion ready to help out if needed), is the simplest, most effective and safest solution in a cave.

While it's fine to believe in the tooth fairy, Santa and the Easter bunny, my advice is to be very skeptical that the gas pixie will show up when you are in desperate need of a lung-full of something nice to breathe—especially in a cave. Even though we teach air-sharing in open-circuit cave programs, there is little in the skill as practiced by most divers that will help out in a real OOA event fuelled by panic and desperation. Added to this, and informed by experience, is a pretty solid opinion that operations such as handing a bottle off to a companion, while in a small passage with silt for a floor, and with one of the party fighting for air, will not end well.

Taking all this into consideration, the best practice would seem to be for every CCR cave diver to carry enough gas to get themselves out solo. It would be nice to think that when a CCR diver is an hour's swim from the cave's exit, and they discover that they have no option but to bailout, that their dive buddy is within arm's reach and not swimming away blissfully unaware of the problem.

It's wonderful to have a buddy's gas as a backup, but primacy dictates that you have sufficient gas to exit without their help if possible. Which brings us to a word about how to calculate how much gas is enough.

SAC to RMV

The process of converting a personal SAC rate (Surface Air Consumption) to a RMV (Required Minute Volume) is as straightforward in CCR cave diving as it is in open-water open-circuit diving… with one added step.

SAC (the volume of gas a diver breathes each minute) is a constant and is influenced during a dive by several other factors such as depth, workload, stressors such as water temperature and visibility. The simple conversion for SAC to RMV is to multiply SAC by depth, and then multiply that number by a dive factor to account for the workload, etc, for the dive.

Here's a simple example. Let's use a SAC of 15 litres per minute and a cave dive on which the average depth is 25 metres. Let's also say this cave is familiar to the diver, has light current (out-flow) and the water is relatively warm and clear (21 degrees and more than 30 metres of vis). For this dive, we might use a dive factor of 1.50.

So here's the arithmetic: 15 X 3.5 (25 metres expressed in absolute pressure) X 1.50. The result is an RMV of approximately 80 litres per minute (78.75 l/m).

ABOVE The author using his AP rebreather at Jackson Blue Springs, Florida, USA

So far so good. If we are planning a dive to swim into the cave for 40 minutes before we turn, we will need approximately 40 minutes-worth of gas if our unit fails us at maximum penetration. That equals 3200 litres… or a 16 litre cylinder pumped to 200 bar… or one and a half 11 litre tanks filled to 200 bar.

Now this assumes something critical, and something that is different for a CCR diver compared to an open-circuit diver. The critical difference—the additional step that separates this type of calculation for a CCR diver as opposed to an open-circuit diver—is hidden in the nature of the possible events that would cause a CCR diver to bailout in earnest and completely from her rebreather's loop. One of these events could be carbon dioxide break-through, and this might influence the respiration rate of the diver… dramatically, and for several minutes. In other words, the 3,200 litres that we calculated to get a diver from maximum penetration to the surface might not be quite enough. We might need to revisit the Dive Factor and change it from 1.5 to an even greater number.

Of course, back-of-a-napkin calculations such as these are fine discussion points while chatting with friends someplace warm and dry with a plate of olives and a glass of wine on the table in front of you. However, the only truly safe numbers come from what is euphemistically called "field-tested data". And these you need to collect yourself.

If the first rule of technical diving is: "Always have a sufficient volume of appropriate gas to breathe throughout the whole dive!" then perhaps the first rule of CCR cave diving should be: "Never take a CCR into a cave that you have not swum out of using open-circuit."

Final word: take notes… read them often! ■

Steve Lewis regards himself as a cave diver, primarily. He is a technical instructor-trainer with ratings from TDI and PSAI, and among other foibles, teaches divers to have fun and stay safe on two very different CCR units, neither of which lends itself, in his opinion, to team bailout.

Fluoro Diving

And Photography

There are many varieties of tropical morays but we have only found one species that fluoresces, so far

Text and photos
by Kevin Deacon

As day turned to night, two Australian icons—Sydney Harbour Bridge and the Opera House—were silhouetted on the skyline. In the fading light, we prepared our equipment for another excursion into Australia's temperate seas to discover and prove the existence of fluorescing marine life forms in environments other than tropical oceans.

As our fluoro lights probed the stygian black void, splashes of emerald green revealed fluorescing corals among the rock—a vision that complemented the bright pinpoints of harbour lights above. After 50 years exploring the oceans, I had come full circle. This dive would complete a quest I started in my home town 47 years ago.

The dive was the culmination of many dives over the past six months together with Cherie, my wife and dive buddy, as we explored Sydney Harbour and other dive sites along the shores of our New South Wales coastline making new discoveries on every dive. Many

Kevin and Cherie Deacon prepare fluoro lighting and camera equipment for an exploratory dive in search of fluorescent marine life in Australia's Sydney Harbour. Photo by Josie and Jason Ruth

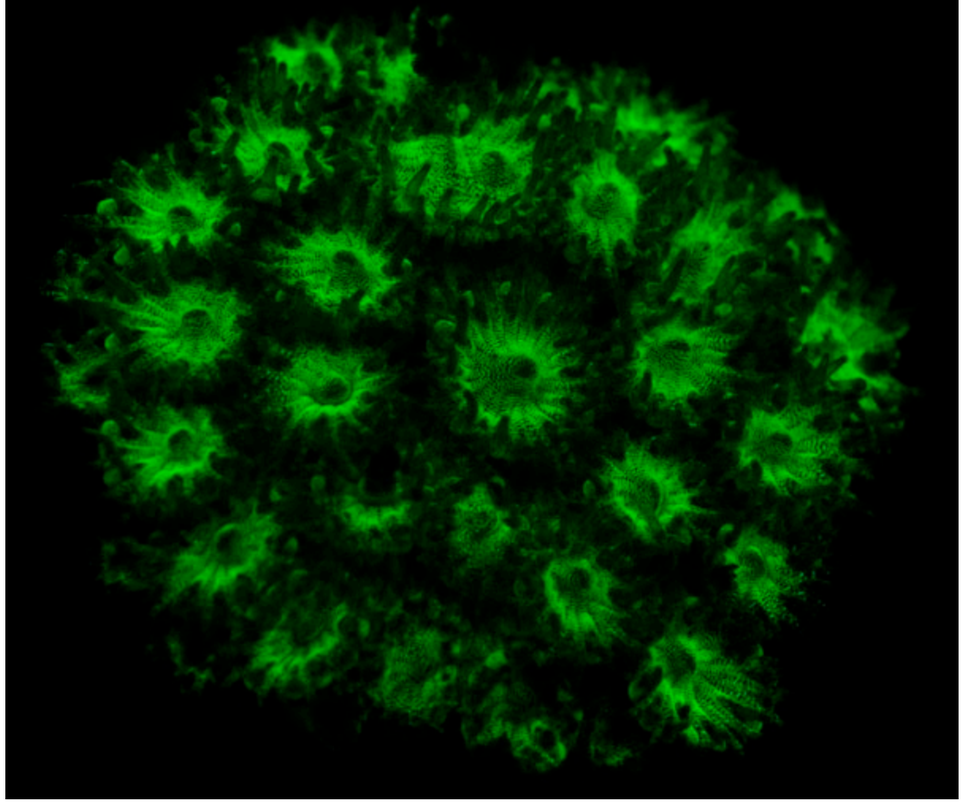
Fluoro Diving

are world first, revealing fluorescent behaviour in species never before seen, or captured, fluorescing.

I have been fascinated with the concept of fluorescence in corals since 1966 when I first gazed upon a beautiful portfolio of fluorescent coral images in a coffee table book by Dr Rene Catala, director of the Noumea Aquarium in New Caledonia, the man who revealed fluorescent coral to the world via his specimens in aquarium tanks bathed in Ultra Violet light.

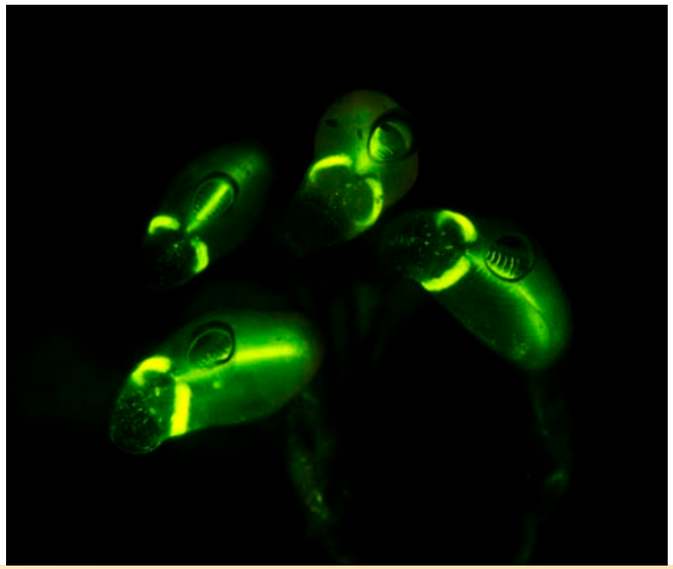
Inspired by this, I waterproofed a 12-volt UV Fluoro light powered by a limited length of cable attached to a car battery on the surface. Descending to shallow depths in Sydney Harbour, I managed to reveal fluorescence in our local temperate species of coral but the light emission was weak so it was all rather uninspiring.

That was in 1966, and as an 18 year old just starting out in underwater photography, there was a wealth of other subject matter that would attract my attention over the next 47 years. But the fascination of fluorescence and the potential for new discoveries never really left my mind, especially as it seemed by the 21st century that new discoveries underwater seemed elusive.



In the shallow cold waters of Australia's Sydney Harbour, in sight of the Harbour Bridge and the Opera House, the cold water coral species *Plesiastrea versipora* fluoresces

For a brief moment in recent years florescence in corals was once again revealed to the world in a spectacular portfolio by famed *National Geographic* photographer David Doubilet. But once again, this was a limited exposure, as corals were collected randomly and brought to a UV light source at a jetty so they could be photographed on site underwater. The images were excellent and once again, inspiring, but the process had not made a major leap in four decades.



Our first temperate ocean fluoro diving discovery was the presence of tiny ascidians (sea squirts) in their thousands glowing like fairy lights guiding us deeper into the darkness of the depths

New technology

Imagine if we could be free of such limitations and take the light to the animals, free to roam the seven seas and reveal all the fluorescent life forms that I was certain must exist. This would require a whole new technology, and fortunately, it was ultimately developed by Dr Charles Mazel of Nightsea.

A number of underwater photographers had already embraced the technology and begun capturing a few amazing images of fluorescing marine animals in tropical seas. It was my goal to pursue and capture even more tropical species fluorescing, but more importantly, to be the first to capture and prove the existence of such species in our cold temperate Australian seas south of the Great Barrier Reef.

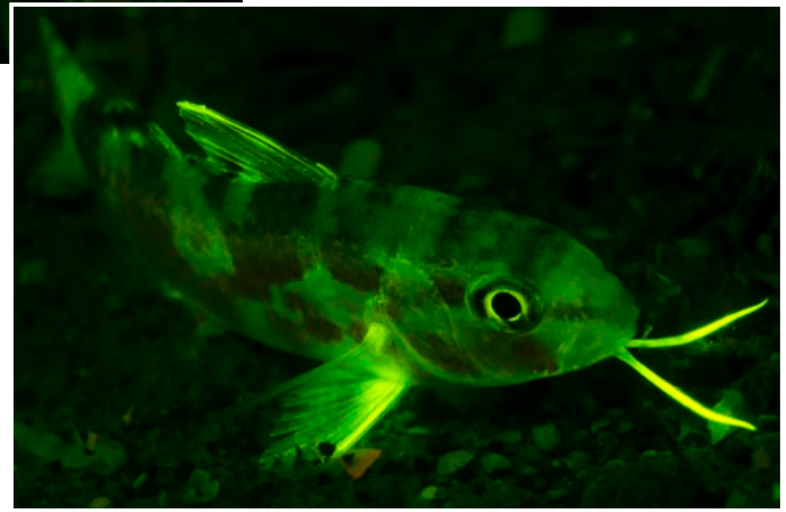
The green moray eel (left), common in Australian temperate seas, is a night predator. We wonder if fluorescence is a link to other night predators' behaviour; Bristle worms (right), also known as fire worms, scurried about in the darkness giving the illusion of emerald jewels in motion

Temperate water

As total darkness fell on the dive site, Fly Point at Nelson Bay Port Stephens, Cherie and I descended to the seafloor using white light to find our way. Once we were settled, we switched to the Blue wavelength created by Nightsea Excitation filters and flipped our yellow barrier filters over our dive masks. Now everything went black, as only subjects that fluoresced would be seen, so it required good buoyancy control and the use of our probes to feel our away around the dive site.

We scanned the darkness with our lights, and ahead, a carpet of fairy lights was revealed, as hundreds of tiny ascidians, sea squirts, fluoresced like Chinese lanterns. This was a good start, but I was hoping for something more exciting than sea squirts.

Hovering amongst the fairy lights, our eyes caught a sudden movement, slithering through the darkness—a moray eel fluoresced in bright yellow-green. Then, here and there on the sand, goatfish hunted for food, their tentacles glowing bright, their bodies and fins displaying alternating degrees of fluorescence, as if they had a dimmer switch controlling the intensity. Who would have imaged fish could do that?



Elsewhere on the sand, tiny emerald jewels roamed. On close inspection, these were bristle worms also known as fire worms due to their nasty sting. Why do they fluoresce? Are they communicating, "Don't touch"?

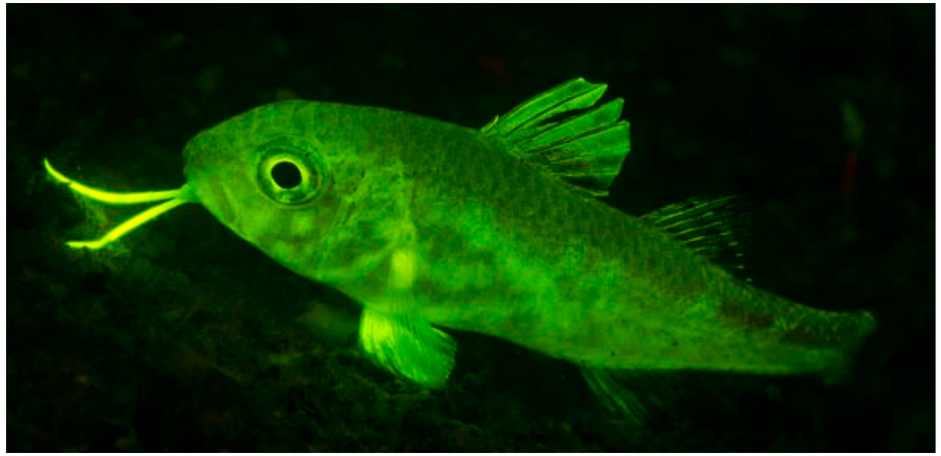
Floating along in a gentle current, we were treated to multiple examples of tube anemones displaying their range of fluorescent colours, each one reminded me of a miniature display of fireworks, as their tentacles flowed in the current.

Sponges covered every rock, but we could barely see them in the darkness. Much of the marine life carpeting the seafloor did not fluoresce, but incredibly, just one sponge glowed in the darkness. On closer inspection, I found it was spawning, and the spawn was florescent. What would be the purpose of that? So many questions like this will keep marine science busy for decades.

Then out of darkness emerged the largest nudibranch I have ever seen in temperate seas, a Major Armina—at 90 centimetres, it is a giant among nudibranchs. They are rarely seen, as they only emerge from under the sand to hunt and feed on sea pens and soft corals.

This specimen was glowing powerfully in a vivid display of fluorescing stripes, so powerful in fact it was lighting the sand around it as it hunted. Trailing close behind, a second Major Armina caught up to the first, and they began to entwine in a courtship dance of dazzling florescence.

My heart beat faster, as I fired shot after shot of a display never seen or even imagined before. I was so excited by them that I couldn't tear myself away



Blue-spotted goat fish hunt in the darkness with their tentacles fluorescing, perhaps providing illumination for them? We also discovered these fish could control the intensity of fluorescence on their body and this ranged from almost dark, to bright patches, to full fluorescence

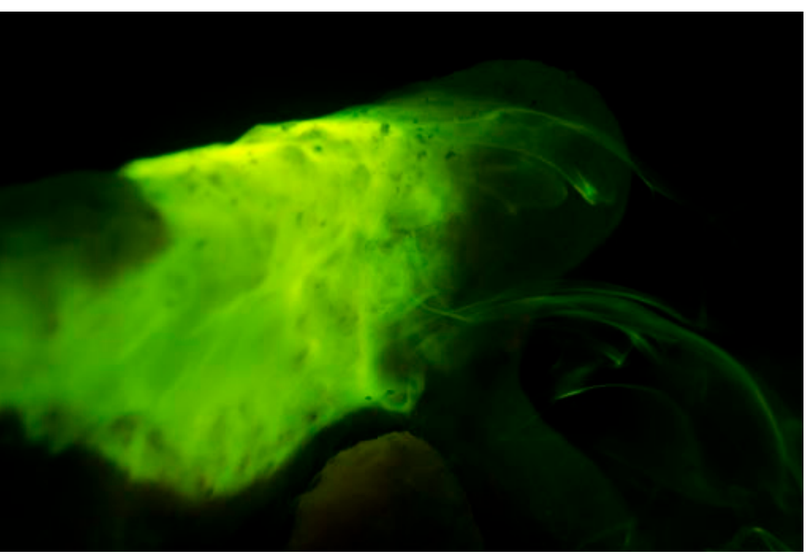
Painted lizardfish, yellow fluorescent eyes staring, haunts the night

to attempt more discoveries, even though my camera monitor confirmed I had the pictures. But the decision was eventually made for me, as the pair parted company and crawled off into the darkness in different directions.

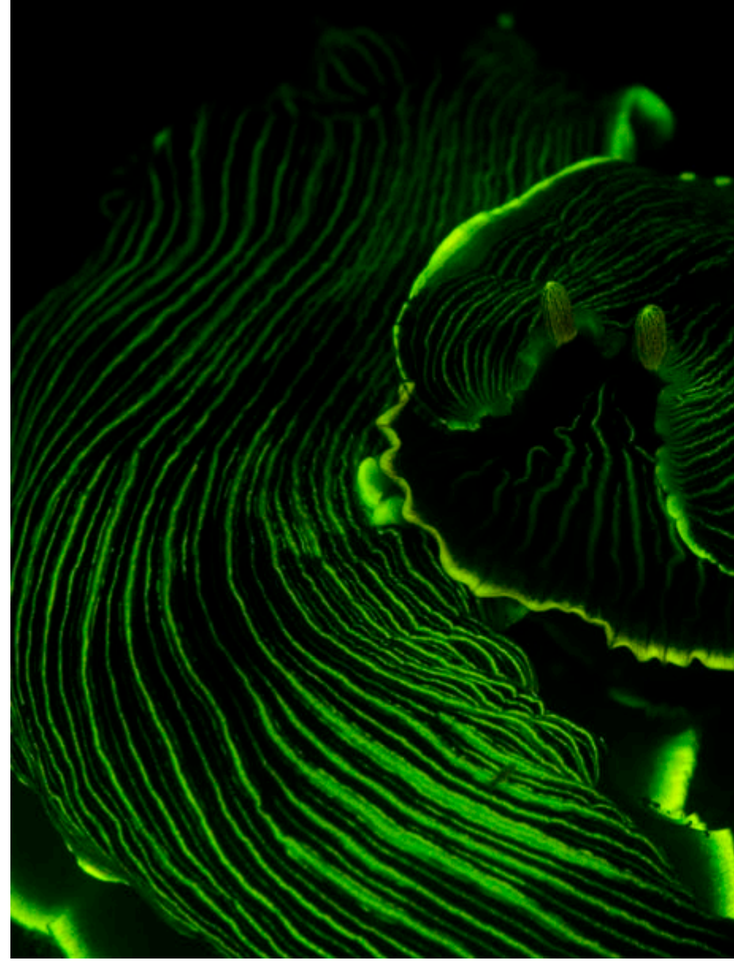
Probing the dark night underwater in almost total blackness in an estuary that was also a known haunt of bull sharks and young great white sharks requires a certain mindset that would not come naturally to many. One must also be very careful to move slow and gentle, as you will not see the many stingrays, scorpionfish, sea urchins and other species that could cause harm to the unwary or careless diver.

Fluoro zen

Strangely enough both Cherie and I found the sensation of darkness guided only by emerald jewels of marine life soothing, almost a Zen like experience interspersed with moments of excitement with each new discovery. On many dark dives we could only feel, not see, many marine animals, as they bumped us in their desire to flee when we inadvertently disturbed them. We would sometimes wonder what animal it was, or for that matter, what the next one would be!



Another amazing discovery was a sponge spawning in fluorescence but only the spawning section of the sponge fluoresced



As we probed the night seafloor on more exploratory dives, we revealed even more florescent creatures of the night. In general most fish do not fluoresce, so we only glimpsed dark shadows, as they morph into the night.

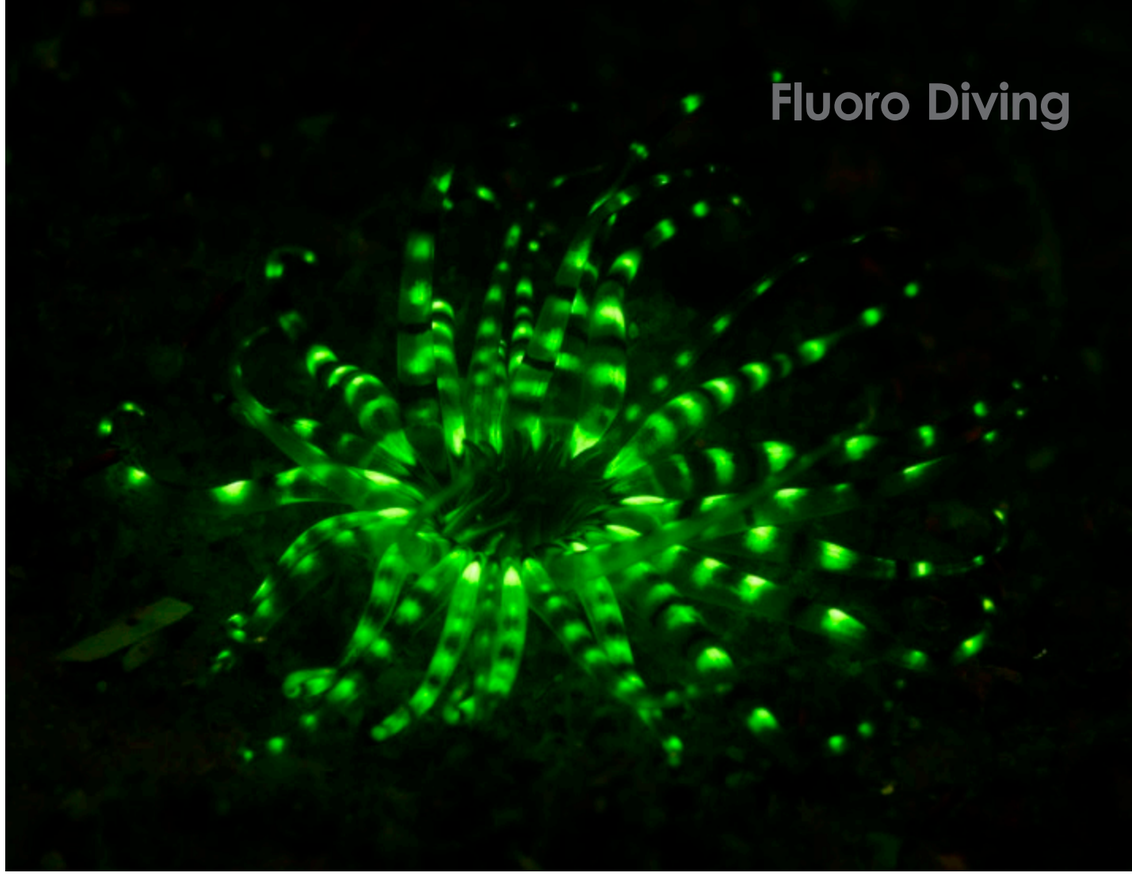
However, with fluoro, exception is the rule. Just at the edge of my fluoro dive light range, I caught a glimpse of a thumb-sized object glowing in the sand. Moving closer, I noticed it had an eye, and once the subject filled the frame magnified by my 60mm macro lens, I could detect the mouth of razor sharp teeth typical of a lizardfish. Before long, it wriggled out of the sand revealing itself glowing in emerald greens and haunting yellow eyes—a serious ambush predator. But why announce itself in such a spectacular way at UV wavelengths?

Equipment

Equipped with 12-litre dive cylinders filled with nitrox and dry suits to keep warm, we would spend 90 to 100 minutes underwater on each dive.

Exhausted and low on air, we completed a safety stop in the shallow kelp gardens near the shore. Suddenly, another glimpse of something glowing in the dark. Clawing

Two Major Armina nudibranchs (top) swirl together in a slow motion courtship ballet illuminated by their own fluorescence; Blackface Armina with its prey, a sea pen, also fluorescing. Even more remarkable is the fact that none of the other sea pens we have encountered fluoresced. Could this be a reaction to the presence of the fluorescing predator?



THIS PAGE: Some species of tube anemones fluoresce while others do not

my way down into the kelp head first with my dry suit boots filling with air, I was struggling to maintain control.

To my amazement a large tassel-snouted flathead, a species well known to me, was fluorescing in greens, oranges and burgundy. The algae bed it rested on was glowing dark red. My excitement knew no bounds, as I struggled in my ungainly position, mask leaking due to being inverted, and the slight swell rocking me back and forth.

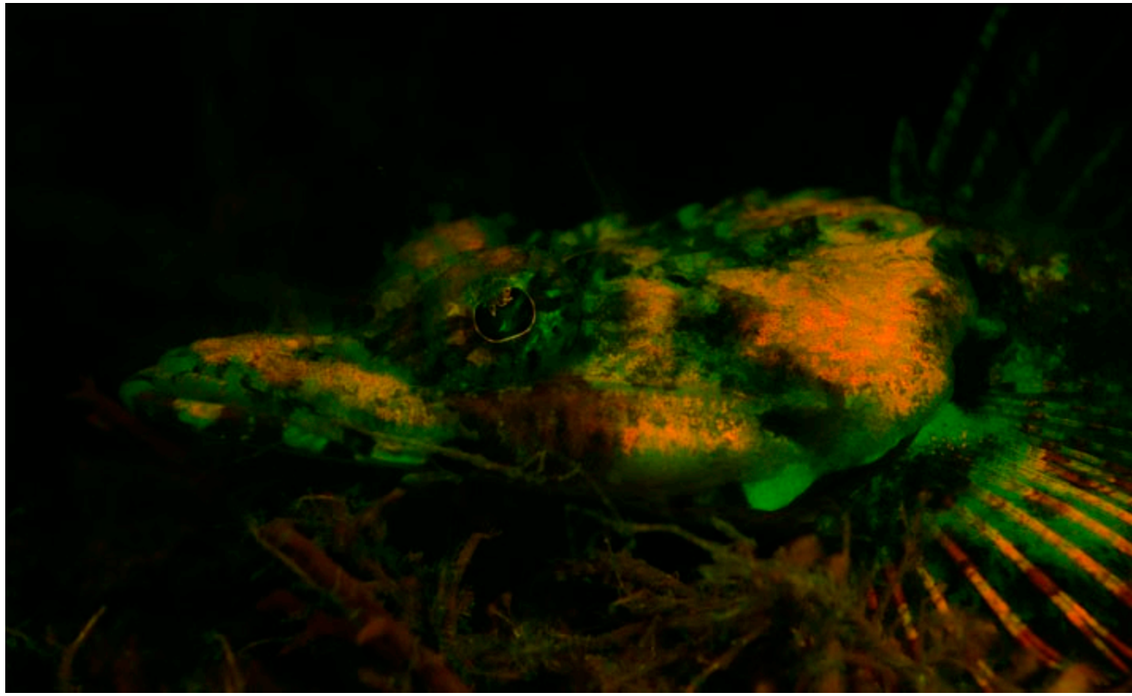
I was determined to capture yet another image showing evidence of the diversity of temperate water marine life fluorescing. After several shots, I gave up. I could only hope, I got it.

As Cherie and I emerged out of a calm moonlit sea, not another soul was in sight. The night was still and completely quiet. The stars were the only witness to our endeavours. We were elated, we were inspired, and best of all, I felt vindicated.

Tropical fluoro diving

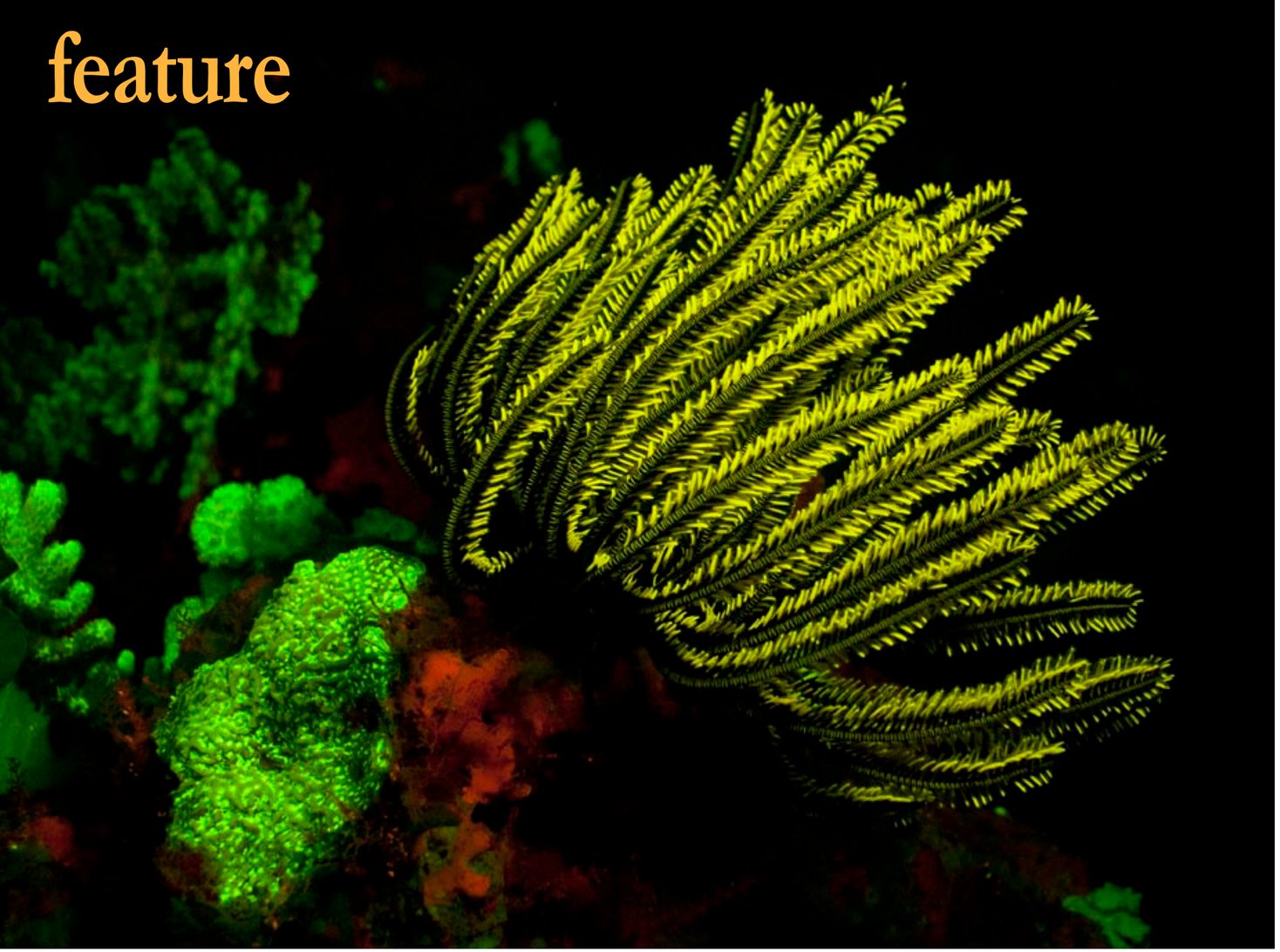
Our first fluoro dives were conducted in a traditional coral environment among the pristine reefs of Wakatobi Resort in North Sulawesi. Wakatobi Resort is a pioneer of the fluoro diving experience, and all guests have the opportunity to try it there.

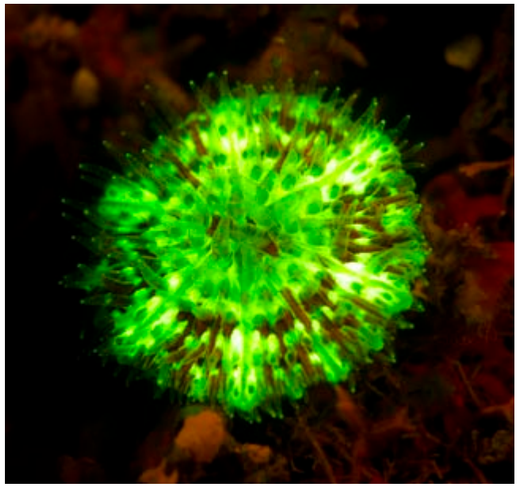
Although one has an expectation of what it might be like to fluoro dive a coral reef, nothing prepares you for the reality. The variety of



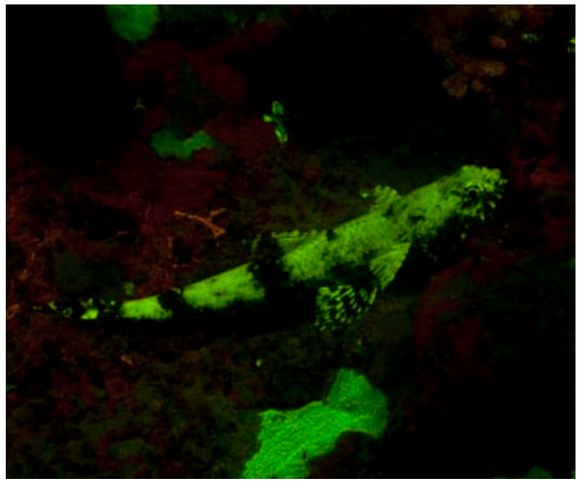
Few fish fluoresce but this tassel-snouted flathead is a spectacular exception to the rule

Multiple species of tropical corals fluorescing





CLOCKWISE FROM FAR LEFT: A drab brown crinoid feather star fluoresces bright yellow; Goby fluorescing in metallic orange and red against emerald green fluorescing coral; Fluorescing tropical coral polyps; Tiny mushroom coral, polyps extended, fluoresces



Lizardfish fluorescing

corals in the region of the Coral Triangle, which includes Wakatobi, is incredibly diverse. The moment you descend and scan the reef with fluoro wavelength, the corals light up like a carnival. There is in fact so much fluorescence in the corals, that you have no trouble with navigation or orientation. The vista of an entire reef glowing in the dark will change the way you think about corals forever.

Hunting for new subjects in coral reef environments is in stark contrast to temperate water environments. The fluorescing coral reef is so vivid, it's distracting, and hunting for life forms other than corals is difficult.

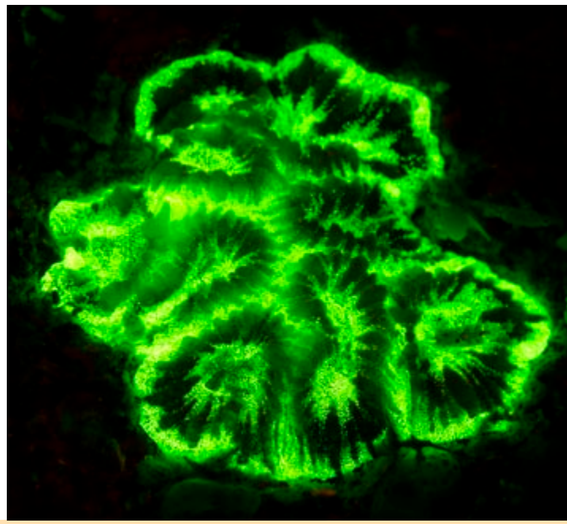
Diving the pitch black environment of temperate water sites is more challenging, but any life form that fluoresces readily stands out.

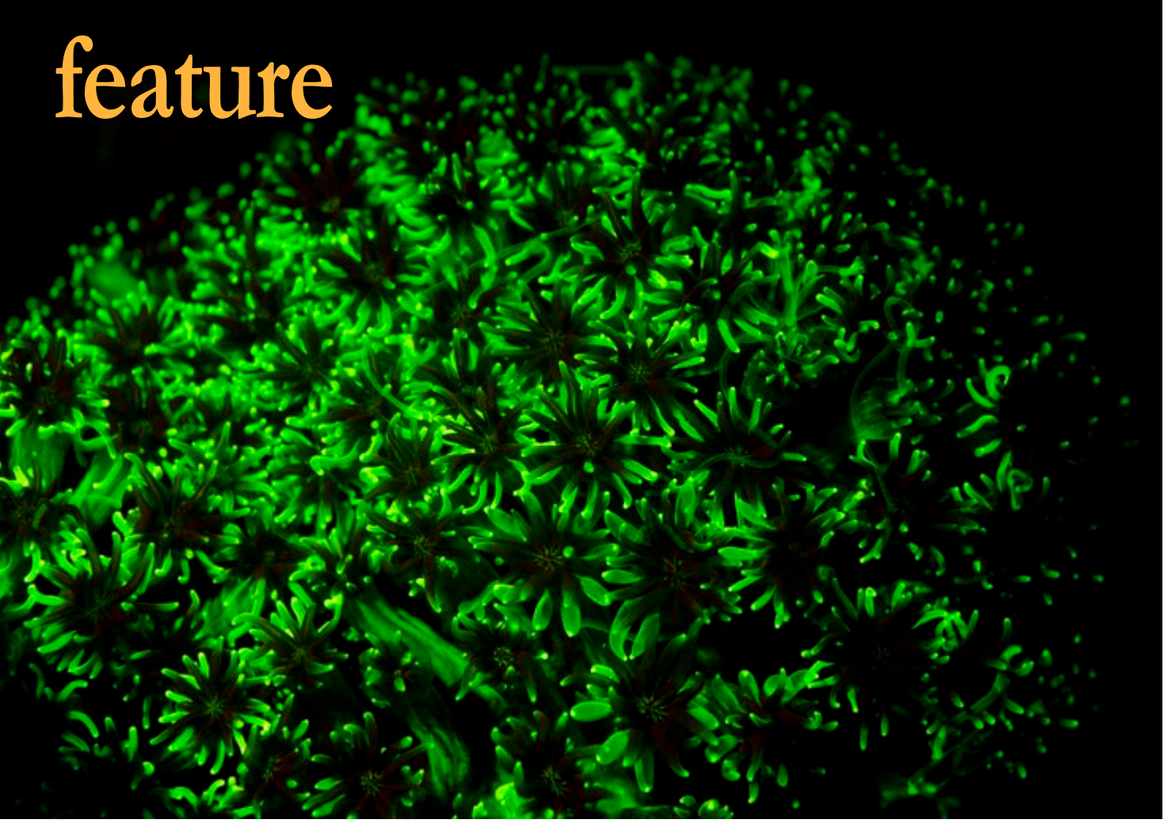
Fluoro technology and photography

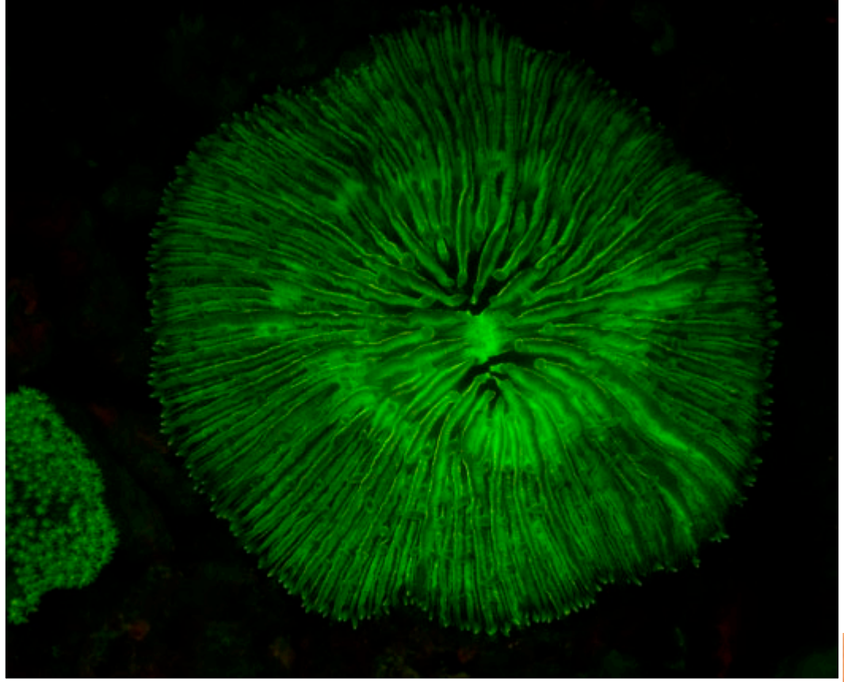
Charles Mazel of Nightsea developed special filters for dive lights, video lights and strobes. These are referred to as Excitation filters. They convert white light to a wavelength close to the blue spectrum. This wavelength reveals fluorescence in marine life and algae provided a yellow barrier filter is worn by the diver and used on the camera lens to block out all visible light other than the fluorescent reaction.

Light and Motion, a company that makes a superb range of dive, photo and video lights in the Sola Dive series in conjunction with Nightsea also produces a dedicated Sola Light that produces the correct blue wavelength with a clip-on filter to convert it back to white light when desired.

Our company, Dive 2000, has also engineered a very convenient swing filter that fits any Sola dive light, thus converting it into a very versatile dive and photography tool, especially if one is using the Sola photo light with the option of white and red nocturnal light, plus the Nightsea swing filter.







Tropical mushroom coral fluorescing

Fluoro Diving

Kevin Deacon is one of the pioneers of underwater photography in Australia. His images have been published worldwide in prestigious books, magazines and advertising media. Kevin and Cherie Deacon along with their team of scuba and photo instructors, dive masters and tour guides operate Dive 2000 in Sydney, Australia's most experienced dive, travel and underwater photographic equipment centre. Dive 2000 is also the Australian Importer and Distributor for Nightsea Fluoro accessories and Dive 2000 Fluoro Products, Seacam Housings and most Underwater Photography equipment. See: ***www.dive2000.com.au***

Fluorescing tropical coral polyps (left); The Sola Nightsea Light (right) provides a dedicated fluoro light wavelength. The Seacam strobe is fitted with a general purpose Nightsea Fluoro Excitation filter. These are available in a range of sizes to suit many strobes including Ikelite DS160/161

I have not found fluoro photography difficult. With powerful fluoro light, the lens autofocus works quite well. However, ISO settings need to be high, as the wavelength of light via the filters on your strobes is weak compared to white light. Aperture settings need to be wider for macro images. I found 800 ISO at F8 – F11 provided an effective exposure with most strobes, but depth of field is reduced at these apertures, so focusing on the key part of the subject is really important.

Camera lenses also need a yellow filter to 'see' and capture fluorescence

Dive 2000 custom designed Swing filter fitted to any Sola light allows instant switch from white to red to fluoro light wave lengths. Inon strobe fitted with Nightsea Inon Excitation Filter

Strobes or video lights can be used much closer to the camera lens and subject matter, as there is no problem with backscatter, since it does not fluoresce, it will not be revealed!

Buddy contact is difficult, as divers don't fluoresce, so we are invisible to each other in the darkness. Cherie and I could easily get separated, so we made a point of always wearing chemical Glow Sticks, which helped to reveal our position, as we individually hunted for subjects. Cherie would also carry extra Glow Sticks as markers for any subjects she found, so she could guide me to them. We also found Glow Sticks useful as navigation way points when we would retrace our path back to the exit area.

The future

Our limited explorations in our local temperate waters, the Tasman Sea off the southern Australian coast, has already revealed many new discoveries and raised many more questions for marine biologists to unravel. As we help equip others and collectively explore even more of our global ocean realm, we are certain a great number of new fluorescent discoveries will come to light. As photographers, we are also excited knowing we have a whole new genre of art to inspire our creativity.

I would not have imagined that 50 years after entering the ocean with black and white film, 12 shots on a roll and flash bulbs, I would still be finding new subjects to capture and new marine life behaviour to discover. The future is still ours. ■

Dive 2000 designed swing filter visor that hinges from the mask frame and semi locks at three positions

Nauticam GH3 Housing

Nauticam has officially announced the release of their housing for the Panasonic Lumix DMC-GH3 camera. The NA-GH3 housing was "pre-released" on the China Nauticam site and then exhibited at the NAB show. Nauticam USA has now confirmed that it will be shipping the NA-GH3 housing from the end of May at a retail price of US$2,250.

Nauticam Canon EOS-6D Housing

Nauticam has announced that the release their new NA-6D housing for the Canon EOS 6D camera at a U.S. retail price of $3,300. The NA-6D housing features the multi controller pad used on their Nikon housings and provides access to the EOS 6D's 8-way controller. Plus Nauticam have also provided a dial that controls the camera's rear command dial on the right hand side of the housing.

Ikelite GH3 Smart Housing

In an interesting development Ikelite has launched a new Smart Housing for the Panasonic Lumix DMC-GH3 Mirrorless Micro Four Thirds camera. Ikelite has previously been largely absent from the mirrorless market, so its decision to develop a new housing for the Panasonic GH3 appears to indicate that they are back. The new housing is classic Ikelite and shares the TTL flash control and polycarbonate design of other Smart housing from the company, but also moves the video and AF lock controls onto the side of the housing for thumb activation. The Ikelite GH3 Smart Housing is available from the end of May at a U.S. retail price of $1,500.

Sea & Sea's MDX-6D Housing

Sea & Sea has announced the release of their housing for the Canon EOS 6D SLR—the MDX-6D. The new housing is made from black anodized aluminum alloy and gives access to almost all of the camera's essential underwater functions, apart from the depth-of-field preview button. The MDX-6D housing can be fitted with an internal version of the YS Converter/C TTL convertor by Sea & Sea dealers—enabling switching between TTL and manual strobe exposure from the housing. Other key features of the MDX-6D housing include: shutter lever tension that can be adjusted with a spring; a port lock that can be accessed without opening the housing; a new grip design with threadless fixings; a tripod socket on the centre underside of the housing; Optical Viewfinder 0.5x as standard; the use of other interchangeable viewfinders; a built-in leak sensor that immediately alerts you to water ingress; and a depth rating of 100m (330ft).

MyShot Photo Contest 2013

Sponsored by ScubaPortal.it, MyShot Underwater Photo Contest 2013 is open to all photographers to compete for valuable prizes in four categories: Reflex Macro, Reflex Wide-Angle, Compact Macro, Compact Wide-Angle. Registration is free. Deadline for submission is midnight (CET) 31 October 2013. A jury will decide the winners of each category, and there will be a public vote for the best three images out of the top 100 pictures (25 in each category). Judges include Marco Daturi, Cristian Umili, Francesco Turano, Adriano Penco, Marco Milanesi and Roberto Sozzani. A closing ceremony and party will celebrate the end of the contest. For info and updates, visit: **Myshot.it**. For any information and to submit entries, email: **info@myshot.it** ■

Ikelite Housings for Nikon P330 and S9500

Ikelite has announced the release of two new housings for the popular Nikon P330 and S9500 compact digital cameras. Both housings are manufactured from Ikelite's proven special polycarbonate blends which are clear, light and strong. Access is provided to the majority of both cameras' main functions, and the S9500 housing can be fitted with Ikelite's WD-4 dome to enable wide-angle photography underwater. Both housings have a recommended retail price of US$400.

Ikelite Housing for Nikon P330


Ikelite Housing for Nikon S9500

Aquatica AD600 Housing

Canadian manufacturer Aquatica has announced the release of their new housing for the popular Nikon D600 "entry level" full-frame FX DSLR camera. The Aquatica AD600 is machined from a single aluminum block and is fitted with their standard double o-ring seals on the knobs and levers so that it can withstand pressures exceeding 100m. The AD600 provides access to the camera's Fn control, which can be customized for a variety of functions, via a button on the rear. It also has a thumb lever for ISO adjustment and three ports for accessories such as monitor or vacuum bulkheads. The AD600 housing will retail at $3,199 in the U.S.A.

DivePhotoGuide/Wetpixel hold exhibit at United Nations

Internet underwater photography sites, DivePhotoGuide and Wetpixel, in affiliation with Blancpain, the Swiss watch company, have created an exhibition of underwater images entitled, "Oceans", on display at the Visitor Center in the United Nations building in New York City, USA. The exhibition celebrates World Oceans Day (June 8) and features 30 underwater photographs and two high-definition videos of various ocean ecosystems around the planet, captured by an international group of accomplished photographers.

"I was extremely excited when the Department of Ocean Affairs approached us about doing a photo exhibition at the United Nations in connection with World Oceans Day," said owner of DivePhotoGuide, Matt Weiss, in a statement. "Beautiful underwater imagery is the perfect medium to convey the importance of protecting the oceans, and the United Nations, especially on World Oceans Day, is the ideal venue to showcase this message."

Contributing photographers include Kurt Amsler and Marc A. Hayek of Switzerland; Laurent Ballesta of France; Daniel Botelho of Brazil; Frederic Buyle of Belgium; Ethan Daniels, Stephen Frink, Burt Jones and Maurine Shimlock, Doug Perrine and Mark Strickland of the United States; Norbert Probst of Germany; Dr Enric Sala of Spain; Masa Ushioda of Japan; William Winram and Keri Wilk of Canada.

The exhibit, which is open to the public from June 5 to August 16, was organized by the Division for Ocean Affairs and the Law of the Sea (Office of Legal Affairs) in partnership with Blancpain, Dive Photo Guide and Wetpixel. For more information, visit: **Blancpain.com**. ■

Lauren Kussro

P O R T F O L I O

portfolio

Kussro

American artist, Lauren Kussro, has been inspired by the sea to create work that is extraordinary, unique and meticulous, capturing in printmaking and printstallations the intricate beauty and poetry of marine creatures and underwater life forms, which divers know and love so well. *X-RAY MAG* interviewed the artist to find out more about her mesmerizing work and artistic vision.

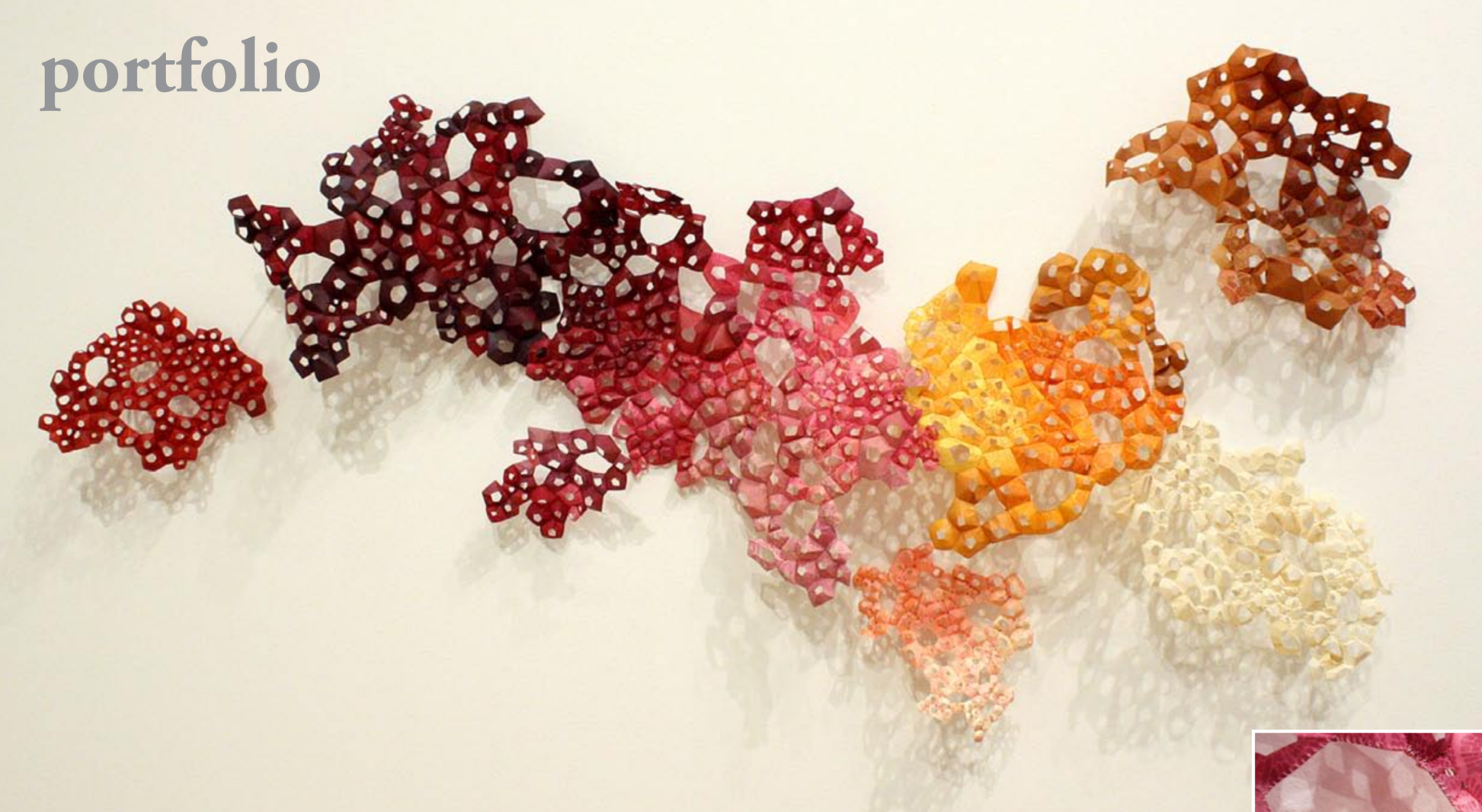
Text edited by Gunild Symes
Photos courtesy of Lauren Kussro

X-RAY MAG: Tell us about your print-making and printstallations. How did you come up with the concept and how are the art works made or constructed—what is your method?

LK: Most of my subject matter is based in nature, so typically my process begins with some general research, mainly image searches on existing organisms

PREVIOUS PAGE AND LEFT: *Coral Confection* Installation by Lauren Kussro. Etching, monotype and silkscreen on paper and wood, paint, cut paper and beads

ABOVE: *Deep Calls to Deep* by Lauren Kussro. Etching, monotype and silkscreen on paper, 11x14 inches



We held to each other so tightly, we became as one, installation by Lauren Kussro. Monotype and silk-screen on paper, glue, beads, thread

from nature that give me ideas and inspiration on what I might like to start attempting to make in paper or wood. From there I do a lot of experimenting with paper, to see what kinds of forms will work and will be effective as multiples.

Often at the same time I'll be working on drawings that are also based in that same research and that end up becoming the patterns on the paper I use. All the paper that I use, I print on first to give it the color and visual texture I want. Initially, I print flats of color, using a monotype technique with oil-based ink, and then print the patterns using silkscreen. When the paper is ready and after I've settled on a sculptural form or model that I am pleased with, I'll start to make the actual piece.

Printstallation to me means a large print-based sculptural piece or installation. Being able to figure out ways of making this kind of art is exciting to me. I love the idea that art could take over a space and be more engaging for the viewer. I find most art in galleries to be very static—people are often separated from it by glass. Sculptural work that is visually very engaging, that has a variety of texture and is surprising in its presentation can be very fun for viewers to experience.

X-RAY MAG: Tell us about your background, training, experience and how you developed your artistic process in connection with themes of the sea or the underwater world.

LK: I grew up in Indiana and was home-schooled all the way through until I graduated from high school. I then went on to earn my Bachelor of Fine Arts degree at the Herron School of Art in Indianapolis in 1998 and went on to earn my Master of Fine Arts degree at the University of Tennessee in Knoxville in 2003.

As a printmaker, I'm intrigued by multiplicity. In my art I tend to be very attracted to items in nature that occur in clusters or groups because it allows me to investigate the multiple. There is also something in the detail and inherent design contained in the natural world that I find profoundly humbling, and wonderful to explore as an artist. As far as subject matter, I've been interested in things like plants/leaves, flowers, cells, fungi, fossils, etc. Many sea forms such as coral, shells, kelp and barnacles can be found in the multiple as well, and those have been a lot of fun to incorporate.

Detail of art work above entitled, *We held to each other so tightly, we became as one,* installation by Lauren Kussro

X-RAY MAG: What about the ocean and its creatures inspires you?

LK: I find the ocean world to be somewhat mysterious. It is a bit more difficult to explore than many above-water locations, and I'm sure there are a lot of creatures and organisms yet to be discovered. I think one of the reasons I like ocean life is that it looks really familiar to us but also extremely alien in a way. Coral is so similar to above water plant forms, but is so bizarre and weird at times! I love that.

X-RAY MAG: What is your artistic mission or vision?

LK: I see my mission as an artist being both the pursuit of beauty and the sharing of that beauty. Through the time I spend in the process of creating art I affirm that beauty has worth and value. Through the sharing of that art I invite the viewer to participate in investigating and enjoying the beautiful.

X-RAY MAG: Are you a scuba diver? If you do not dive or snorkel, what sources do you use to inspire or inform your art works related to the marine environment and ecosystem?

LK: I'm not a diver, but when I was

ABOVE: *We held on so tightly, we got stuck there*, installation by Lauren Kussro. Silkscreen on paper and wood, glue

LEFT: Detail of *We held on so tightly, we got stuck there*, installation by Lauren Kussro

LEFT: *Our Ocean*, by Lauren Kussro. Coral pieces are made out of monotype/silkscreened paper and wood, thread and wax. Larger backdrop pieces are made with wood, paint, and silkscreen. Seven pieces total, made for a space roughly 6x18 feet

BELOW: Detail of *Our Ocean*, by Lauren Kussro

young I was fascinated by the ocean and read a ton of books about the different types of ocean life. I think that fascination is still with me today, and I'd love to eventually have the chance to do some diving. As far as sources, I do a lot of image searches online for organisms I am already familiar with (such as barnacles) and learn information that often leads me to look at other types of creatures. I also make use of the public library and check out books on coral reefs, shells, etc.

X-RAY MAG: What are your favorite underwater subjects?

LK: Right now I'm mainly intrigued by coral and barnacles. As a printmaker they both appeal to me because of their variety and multiplicity, and the way they often cover a large area. They also seem very related to plant forms, which have been a previous subject matter for me.

X-RAY MAG: How does your art relate to conservation or environmental issues facing our oceans and reefs?

LK: I think it can raise people's awareness of the beauty of the natural world, and perhaps a greater appreciation of it.

X-RAY MAG: What upcoming projects, if any, related to the ocean or marine environment are you working on?

LK: I'm actually getting ready to start some new work, and I'm not entirely sure what that will be yet!

For more information, visit the artist's blog at ***laurenkussro.wordpress.com*** ■