

# Filming castles in the sand

Once in a while a shoot comes along that is special. Really special, and you can only hope that somehow you can do it justice. Such was the experience for **IAWF member Hugh Miller** when he was asked to film newly discovered, fascinating 'crop circles on the seabed', created by a tiny and very rare pufferfish.

In early 2013, Tom Crowley, then an assistant producer on the NHU's *Life Story* series, described to me some mysterious, intricate patterns that had been found on the sandy seabed in a small bay off the Japanese island of Amami Oshima. A scientific photographer, Yoji Ookata, had discovered that these extraordinary creations were the work of a very industrious and remarkably small fish: a pufferfish, as yet undescribed in any scientific journal. Pictures started arriving and I could hardly believe what I was seeing: radial ridges and concentric rings surrounding a rippled centre that looked more like a complex crop circle constructed by a geometry-obsessed mathematician than by a tiny, rather non-descript fish.

More information started to arrive. It appeared that these formations were actually nests, constructed by hopeful male puffers looking to attract mates. Spawning took place in the centre of the magnificent structure, after which the male would remain, carefully tending the eggs until they hatched. Once hatched, the male would construct a new nest and the cycle would begin all over again. My job would be to film this process. It was thought that the nest took nine days to build and then hatching another 14 days. Two cycles were expected, meaning the whole process should take four weeks in total. Fairly straightforward then.

Well, no. For a start, underwater shoots are expensive and four weeks is a push for most productions' budgets. In the end there would be a generous 24 days on location.

I started to think about how it might look. Pretty patterns aside, this assignment was essentially to film a pile of sand, surrounded by more sand, while the protagonist was a small (sand-coloured) fish. None of that sounded particularly easy or conducive to a beautiful sequence.

## Underwater grip and glass

I've long been an advocate of using grip underwater. While topside grip has improved in leaps and bounds, the majority of underwater cinematography has been – and still is – handheld. Often it's all that's possible, but benthic\* or reef work can quickly look inferior when viewed on a 55-inch television. When placed alongside topside sequences, it can look just plain wobbly.

I'd built an underwater quad for a shoot in 2009. I wanted to hold the camera from above with the head inverted under a frame that placed the legs out to the side, clear of the shot.



Returning to the surface

\*The benthic zone is the ecological region at the lowest level of a body of water such as an ocean or lake, including the sediment surface and some sub-surface layers.

†A brinicle is a kind of brine icicle that extends downwards to the seabed in icy sea water, killing creatures that come in contact with it: see the footage at: <http://www.bbc.co.uk/nature/15835017>



RED EPIC in a Gates housing, underslung on the custom-built quad mount

“

I'd built an underwater quad for a shoot in 2009. I wanted to hold the camera from above with the head inverted under a frame that placed the legs out to the side, clear of the shot. Four legs, I reckoned, were in this case better than three, providing greater stability and keeping the rear of the camera unobstructed when working.

Four legs, I reckoned, were in this case better than three, providing greater stability and keeping the rear of the camera unobstructed when working. This mount also allowed the camera to be placed as close to the seabed as possible, with nothing between it and the benthos. This had worked well for time-lapse shooting, so well in fact that we had managed to capture very rare footage of the formation of a brinicle† for *Frozen Planet* as the icy sea water froze around the lens port of my camera (<http://www.bbc.co.uk/nature/16250444>). Now I needed a 'Mk 2' of this concept suitable for a movie camera (I would be shooting on a RED Epic), with more articulation in the legs to cope with the tricky terrain and a 150mm bowl in the centre allowing a Ronford F4 head to be inverted. A machined plate on top of the housing allowed a standard dovetail to be attached meaning the camera could remain the correct way up. The monitor could be removed and mounted on the quad so it didn't move while working the panning handle.

RED EPIC on the quad filming completed nest

“

Small tracks and lifts would add a sense of movement and help to reveal the nest in interesting ways... although the jib moved smoothly through the water, its considerable inertia meant that planned rather than spontaneous moves were more successful.

As for glass, I expected to use only two lenses: a Micro-Nikkor 70–180mm and a Nikon 17–55mm f2.8. The 70–180 is the only zoom macro lens I know of and is crucial. Moving to reframe a macro shot without disturbing the animal is next to impossible. You need as much time as possible settled behind the camera with the animals behaving naturally if you're to stand a chance of filming a sequence. I can't imagine filming a macro sequence with a prime lens and wouldn't want to try.

Two further grip projects were pursued in the run-up to the shoot. A lapsed-time sequence would cover the nine-day build of the nest but the angles required to capture this at its best necessitated the camera being four or five metres off the seabed in fixed repeatable positions. Assistant producer Tom took on this challenge and designed a large aluminium scaffold frame with two camera positions made possible through two custom-made V-plates clamped onto the aluminium poles.

### Specific underwater challenges

Things that are easy on land can become major obstacles underwater. I wanted to be able to move the camera in small controlled tracks and lifts. This meant devising a jib, which could survive immersion, that could give the level of control I was used to with the quad, but for more dynamic moves. Of course, I also wanted to run a remote monitor so that I could see what I was doing with the jib. Gates was able to build a custom cable for the RED LCD that was about on the limit lengthwise of what would work. The advantage of the RED

LCD is the ability to map camera functions (such as record trigger and focus magnify) to the user buttons on its side. The Gates monitor housing allowed access to these buttons from the monitor while the camera was out on the end of the jib.

Lighting was also a large consideration. The research suggested that the nests would be found at 20–30m, a tricky depth. Water absorbs light but not equally, with longer wavelengths absorbed most quickly – reds disappear in the first 10 metres or so, orange next, and so on, until all that's left is an ever-darkening blue. I wanted a light source that could stay in position semi-permanently; after all, the nest wasn't going anywhere. I thought a light source suspended midwater might work (anchored to the seabed but held aloft by a lift-bag full of air). Three lines from the seabed, rather like a rope-legged tripod, would keep it in position. Adjusting the length of each line would allow a degree of control over the direction of the light. Between these lines and the lift-bag would sit six Keldon high-CRI lights mounted on a frame, to spread an even, natural-looking light onto the seabed below.

Eventually, in late June, the rest of the crew (producer Miles Barton, camera assistant Kat Brown and AP Tom Crowley) and I landed in Amami and drove to the Marine Station on the southern end of the island. In the usual jetlagged blur, camera kit was unpacked and built on some scrounged bench space; rebreathers were set up under the sweltering tropical sun; and breathing gas pumped into cylinders. Amazingly, on the very first dive we came across a nest. It was old and



The jib with remote follow focus

clearly no longer being maintained, but the pattern was unmistakable. Further searches revealed no other nests nor any sign of the fish though.

With so much equipment involved, any quiet time was seized as an opportunity to build the grip and get it into the water. Meanwhile, Yoji and a support diver continued to search for nesting pufferfish. The large scaffold tower, quad and jib were lifted into the water along with a remote follow-focus, which promptly flooded, destroying its circuit-boards. A blur of late nights and coffee followed as this was rebuilt from spare boards.

### A nest is built

A day or so later, the beginnings of a nest were spotted – in waters far shallower than anticipated. As so often happens when reality hits, the plans changed. The location of this nest meant it was shallow enough to shoot with ambient light so, after all the hard work of creating the 'buoyant' light rig, this was now cast aside (not without a degree of relief though – working within the limited battery life of the lights was an extra headache I could well do without).



Post-storm surf, Amami Oshima, Japan

The pufferfish also threw up some surprises, turning out to be rather smaller than I had expected, as was the nest, the first strokes of which were just beginning to be sketched out by the master artist. Working from the quad, I began to gather footage, shooting at 60fps. Because of the shallow depth, I was able to keep the ISO at a reasonable 800 to 1000. Pre-roll, not long introduced at the time of shooting – and something I could only dream of in pre-RED days – was to be invaluable here.

I began to get my eye tuned in on the little fish. Making his way from the outer edge into the centre, he used his whole body to plough furrows in the sand while his fins were creating whirly details. Occasionally he would disappear for a time, presumably to feed, but other than that he appeared to work non-stop and was still hard at it as the light dipped beyond the point where I could film.

By the next morning the nest had taken even more shape, suggesting he had worked all night. In fact, it was looking far more complete than I had expected and I began to wonder if the nine-day build cycle had been an overestimate. By the end of the second dive, and well into the sixth hour of the day underwater, the little male's behaviour was changing. No longer intent on digging the sandy canyons, he was now concentrating on the centre section. Using a lighter touch with his anal fin, he expertly sliced through the sand to create a fine wavy pattern across the middle. Meanwhile, back on the surface, Yoji confirmed that this was indeed the prelude to spawning, which would start from dawn the following day. I began to feel slightly flustered – was that it now for the nest building? There were still so many shots to get...

### Success for the mates

Sure enough, at dawn the following day, through the low light, I could make out that the male had been joined by a female, swollen with eggs. Having decided the nest was to her satisfaction, she wanted access to the centre, but – clearly torn between two strong innate behaviours – the male was now not sure whether to defend the perimeter of his beautifully crafted nest or let her in so that they could get on with mating! After a bit of an effort, the female got past

the defensive male into the centre and it was as if a switch had been thrown in his head. He stopped trying to chase her away and instead swam alongside her biting her cheek. Apparently impressed by this, she released her eggs, which were already fertilised by the time they fell to the soft, immaculately graded, sandy bed. This was a cycle that repeated itself hour on hour, with the female visibly reducing in size as her store of eggs was depleted.

During the second dive of the day we deployed the jib and, once set up, I was able to try several moves. Small tracks and lifts would add a sense of movement and help to reveal the nest in interesting ways. This wasn't easy though and the learning curve was pretty steep. Although the jib moved smoothly through the water, its considerable inertia meant that planned rather than spontaneous moves were more successful. This was all very well but nothing is more frustrating than seeing the momentum of the camera carry it one way

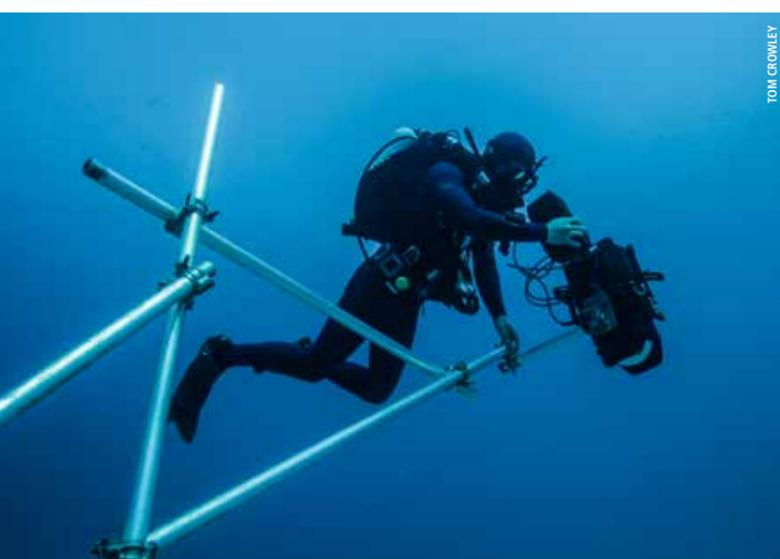
while the fish demonstrating the behaviour we are trying to capture is moving in the opposite direction!

### A storm breaks

Another day of slightly sporadic spawning behaviour passed and then, disaster, a large typhoon began to move in. The equipment was rapidly pulled up and the filming brought to a halt. First came the swell, with surfers appearing from nowhere to enjoy the large breaking waves along the previously placid shoreline. We could only imagine what life was now like at the bottom of the sandy bay, presumably a tumbling washing machine of sand and stones.

Several days passed before the storm cleared and we could get back into the water. Three fish were spotted – but no sign of any nest. The formerly flat sand had been transformed by the heavy wave action into deep, compacted ridges, extending right across the bay. Looking at it now I couldn't imagine the pufferfish even contemplating making a nest until these ridges had worn away.

For several days we searched, taking it in turns to examine different areas of the bay but to no avail. This threw into sharp relief the odds we were up against. The nests had only



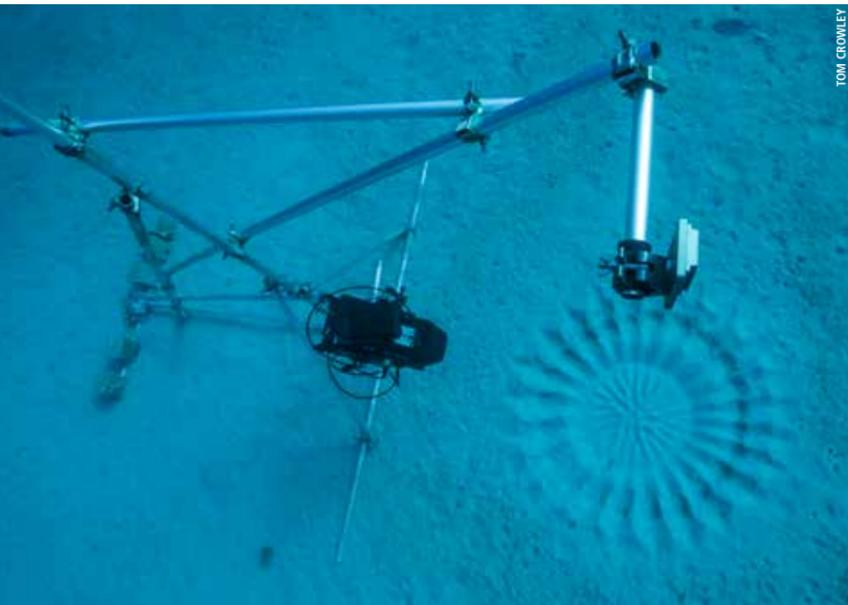
The scaffold allowed a fixed, repeatable position mid water

**Integro Insurance Brokers Ltd**  
Media Insurance Specialists  
john.claffey@integrogroupp.com 01206 500000 www.integrogroupp.com

**Cover for freelancer's own and hired-in equipment**  
**£3,000,000 public liability as standard**  
**Fast track claims service**  
**Personal accident**  
**Worldwide cover**  
**Travel**




Authorised and regulated by the Financial Conduct Authority



TOM GROWLEY

Top shot – this viewpoint became a BBC1 ident

ever been seen in this one small bay; sport diving occurs all over this end of the island but the intricate nests had never been seen elsewhere. During the whole shoot I had only seen just one male and two females. Although there was clearly much to learn about the natural history of this fish, one thing we did know is that it is definitely rare.

### Completing the sequence

Taking stock of the rushes, we did have a sequence but some important shots were still missing. So, with just a couple of days left, Tom and I decided to try a wide sweep of the bay. As I paused in the quiet inky blue of about 20m, momentarily lost in thought, I was snapped back to attention by Tom pointing and waving his hands. It was a nest! It was deeper and there was some current flowing here on the outer edge of the bay – but perhaps that was to the little fish's advantage. The current had smoothed the rippled dunes flat, providing him with the blank canvas he needed. Returning to the boat we agreed that this nest was probably at the start of its build, most likely the first day. We hurriedly turned the gear around, and jumped back in. Tom moved the large frame down the slope in preparation for the highly desired top shot.

Arriving back at the nest with all the gear we were in for a shock. The nest was complete! Somehow, our pufferfish had managed to finish the nest in the short time we'd been away. Here was the perfect opportunity to get the top shot – but I'd got the 70–180mm lens on. With a heavy heart I shot the locked-off top shots from Tom's scaffold rig with a dSLR he had brought for stills and did what I could on the RED on the long lens. I felt sick at the lost opportunity.

Early the following day – our last – with the 17–55mm attached to the Epic, I dived down, expecting to see the start of spawning, but once again I was caught on the hop. The nest had degraded as if in a post-spawn state. This was deflating and very frustrating; there was nothing to do but wait. One hour went by, then another, and meanwhile I was getting chilled. Then, with our 'deco obligations' rising towards our limits, the male returned to dig. I hadn't seen any females around but here he was, working solidly again, digging the furrows that would bring this nest back to its perfect form. By

now, however, we had to go. Diving has its limits and the longer we spent at depth breathing pressurised gas, the more unmetabolised nitrogen was being dissolved into our bodies. Carefully we made our slow ascent to the surface.

Back on the boat I once again took stock. We had one dive left and all I wanted was that crucial top shot. If I went straight back in, the nest wouldn't be near completion and I would use my available dive time just waiting it out. But, then again, at every point during this shoot the little pufferfish had confounded expectations. Maybe it would spawn in a matter of hours. Weighed against these thoughts was the fact that the high midday sun was approaching. At 20m down, this top light would become a very flat, diffuse blue, filling all the shadows and removing all definition from the nest. If the shot was to be what I imagined it could be, the light must be right – so I decided to wait. Sitting on the boat, willing the midday hours to go by was excruciating and I had the distinct nagging feeling it all might be happening right now, out of sight, while I was twiddling my thumbs up on deck.

Eventually the sun began to drop and we jumped into the water for the very last time. The new nest was some distance away, so I had plenty of time to wonder what I would find when I got there. The scaffold and quad emerged on the edge of visibility, like silent sentinels, and I slowed down, approaching carefully. I could hear the blood pumping in my ears after the long swim and tried to slow my breathing. The nest was there, finished and well-defined – and the male was there too, fussing over the final details. I



KAT BROWN

The tiny master craftsman at the heart of this complicated shoot!

felt ecstatic; everything had come together at the last possible moment. I waited a bit, letting the sun sink a little to deepen the shadows, before methodically working through the shots I had been hoping for, checking and rechecking settings and focus, aware that any small lapse in concentration would mean this last chance was lost. Happiness and relief passed through me as I watched from above, perched high on the scaffold. With the camera humming gently from within its machined cocoon, far below, the little pufferfish put the finishing touches to his fantastic castle in the sand.

### Fact File

IAWF and GTC member Hugh Miller is an underwater cameraman specialising in animal behaviour. He has won a couple of team Emmys, a Panda and been nominated for a BAFTA for his natural history work.

Contact Hugh on: [hm@hughmiller.uk](mailto:hm@hughmiller.uk)

# WHO SAID TOUGH CAN'T BE LIGHT?



INTRODUCING **PELI AIR** – UP TO 40% LIGHTER

**PELI AIR** Cases offer innovation with an equal balance of toughness and lightness.

The Peli™ Air Case has been designed to cut weight without compromising durability. Our engineers have revolutionised the protector case by reducing structural waste while preserving Peli's legendary standards of strength.

NOTHING PROTECTS LIKE PELI. GUARANTEED FOR LIFE

This new line is coming soon: [www.peliproducts.co.uk/air](http://www.peliproducts.co.uk/air)

**PELI AIR**

T: 01457 869999

**PELI**Products.co.uk