

The making of IMAX® Deep Sea 3D



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Crewmembers aboard Ocean Explorer 1 gently raise the IMAX ® 3D out of the water in British Columbia. Photo copyright© 2005 Warner Bros Entertainment Inc. Photo Peter Kragh

For filmmaker Howard Hall, diving and photographing the undersea world has been a lifelong passion. Hall has been involved in documenting the life supported by the world's oceans (through writing, photography and filmmaking) since the early 1970s, serving in a variety of editorial capacities for some of the most esteemed wildlife periodicals, including International Wildlife Magazine, Ocean Realm Magazine and Fathoms Magazine. His internationally recognized photographs have been published in

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hundreds of books and magazines (including Life and National Geographic) and he has authored several acclaimed books on the subject.

It was only natural that his career should evolve from still photography to filmmaking, working in a variety of roles including director, producer and cinematographer. With the pioneering development of a large-format, underwater IMAX 3D camera, Hall was then invited by co-founder of IMAX and producer Graeme Ferguson to share his superlative



Crew members Bob Cranston, Mark Thurlow, and Howard Hall pose in their dry suits with the IMAX ® 3D camera and housing. Photo copyright © 2005 Warner Bros Entertainment Inc. Photo: Drew Fellman

skills and knowledge, shifting into this technically challenging art form with the entry of the acclaimed 1994 IMAX 3D title Into the Deep (the first-ever, giant-screen undersea motion picture).

Director Hall comments, "I like working with the big, 70mm, IMAX 3D camera because it's certainly challenging. We had always wanted to return to the subject matter, ever since Into the Deep came out. It was somewhat surprising to us that it took a decade for that to happen. The learning curve was so steep

when we were making that film, that by the time we were finished with the project, we were just beginning to figure out how to use the camera system and how to capture good, 3D images. For a long time, we just really wanted to build on our experience and try to do better. With this new movie, we have done that."

As with any technological advancement, it takes time for not only the refinement of the equipment, but also for technicians to become fluent in their use of the hardware. Now, years after their first undersea



Director Howard Hall and cameraman Bob Cranston use the IMAX® 3D camera to sneak up on a green sea turtle in Hawaii. Photo copyright © 2005 Warner Bros Entertainment Inc. Photo Peter Kragh

Right. Director Howard Hall pushes the IMAX®, 3D camera in its housing back to shore at La Jolla Shores, California. Photo copyright © 2005 Warner Bros Entertainment Inc. Photo: Richard Herrmann



3D film, Hall was better able to maximize all that the IMAX 3D camera had to offer.

The director explains, “When we made *Into the Deep*, the system hadn’t been completely finished, so there were some options that the camera was eventually going to have that weren’t available to us during filming—lenses that were on the drawing board that hadn’t been finished, that sort of thing. For *Deep Sea 3D*, we had a better selection of lenses and a few other devices that made the images we acquired much more exciting. The biggest change was the addition of the macro lens, which enabled us to get closer shots than we were able to shoot during *Into the Deep*.”

“This time we definitely wanted to film a broader range of animals than covered in *Into the Deep*. We really wanted to bring to the audience a sense of the huge diversity of the life that is the ocean. A lot of people have no clue in terms of what a wonderful parade of strange and exotic-looking creatures share our world with us,” says producer Myers.

All In A Day’s Shoot

While compared to a crew employed by an average, Hollywood (2D) film production, Hall’s crew might be considered small in number. But

there is might in the number of seven...eight when Hall’s colleague, producer and wife Michele joins the crew of divers, which is augmented with a handful of surface crew who remain on deck. The team also included marine biologists and local guides – hand-picked for their knowledge about each location.

Because of the size of the 70mm film negative, the IMAX 3D camera holds a magazine of only three minutes of film—and every second of that film is made to count. As if preparing to cut a diamond, all preliminary work is painstaking, to enhance the probability that the scene wanted is the scene captured; and, as with a diamond cutter, the nature



Crewmembers gently lower the IMAX® 3D into the water in the Bahamas. Photo copyright© 2005 Warner Bros Entertainment Inc. Photo: Peter Kragh

documentarian usually has only a single chance to capture the desired shot. So, the majority of the principal photography time is spent in preparation (and after-shooting activity)...so much so that shooting three minutes of film can take upwards of two hours by the time everything is set up.

A typical shoot goes something like this:

Once a location is finalized by the “film team” of Hall, Cranston and two assistant divers (who scout unencumbered by camera equipment), two or three “launch and recovery” divers descend to the selected location to deliver the tripod, as much as 150 pounds of stabilizing weight for the tripod, the camera and a lighting rig. It takes around 30 to 45 minutes to dispatch and assemble all the gear. All of the activity often roils the water and decreases visibility, so the filmmakers sometimes wait another 30 minutes for the water to clear. By the time the subjects have cooperated, the camera has rolled and the desired images have been captured on film, more than two hours may have passed, resulting in



Director Howard Hall and cameraman Bob Cranston take a dive with the IMAX® 3D camera in the Gulf of Mexico. Photo copyright© 2005 Warner Bros. Entertainment Inc. Photo: Michele Hall

only three minutes of exposed film.

The divers responsible for filming (Hall and Cranston and two assistants) have remained at depth all that time and, as a result, must often undergo decompression before they’re able to surface. Returning to the surface with all of the equipment while undergoing decompression is not practical, so using diver-to-surface communications Howard calls for the same crew that delivered the camera and accompanying rig to retrieve it. As the launch and recovery teams do not remain at depth longer than it takes to accomplish their tasks, no decompression is required for them to immediately return to the surface.

The film team, who remain at depth throughout the location scouting, camera rig assembly and filming, utilize mixed-gas re-breathers, which allow them to remain underwater for these extended periods of time. These divers undergo stage decompression (surfacing in stages and lingering at certain depths on their way back up) before

rejoining the crew above.

Sometimes the film team stays underwater during film and lens changes instead of decompressing and returning to the boat. A film change usually takes about 45 minutes. This process can be extended to allow for a variety of variables. The camera must be delivered to the surface to accomplish both of those tasks. (Two technicians who specialize in the IMAX 3D camera are onboard expressly to load film, execute lens changes and generally maintain the the camera and underwater housing). And some locations chosen by Hall and his crew required even more preparation and precaution (more explained below).

With all of this prep work and diver activity happening well within view of the proposed subjects, the question must be asked: How do you keep an octopus from “returning to his trailer” and refusing to take part when it’s his turn to film?

Howard Hall shares one of the secrets of underwater filming: “One of the tricks of doing this kind of film is choosing subjects that are predictable enough—you know what they’re going to do and you pretty much know how much activity they will tolerate. There are a lot of things that would make wonderful scenes in IMAX 3D that we don’t even think about shooting. Lots of times we’re down there and there’s something going on with an animal nearby...and one of my crew will call and say, “Look over here! Look what’s happening. This is great!” And my attitude is usually, “Well, so what?” Being able get the camera, move it to the animal and shoot it just isn’t practical, the animal isn’t going to tolerate it. The subjects we do choose will tolerate all the diver activity it takes to set everything up, along with the accompanying noise and ruckus.”



IMAX camera technician Stuart Macfarlane loads two reels of film into the IMAX® 3D camera—one for the right eye and one for the left eye—in California during the filming of the IMAX 3D film DEEP SEA 3D. Photo copyright© 2005 Warner Bros. Entertainment Inc. Photo: Drew Fellman

An Array of Locations

Beginning in the fall of 2004, the filmmakers and crew set out for the Sea of Cortez, between the Baja peninsula and Mexico. There, they filmed the Humboldt Squid, which presented a few challenges to Hall and crew. He comments, “It was probably the most difficult thing we did.”

The nighttime sequences were filmed at a relatively moderate depth of about 30 feet...yet over a chasm that reached a depth of 500 feet...

and sometimes lasted until 5 A.M. Humboldt squid, some weighing over 100 pounds, are considered dangerous predators with a voracious nature that can switch from carnivore to cannibal in an instant. Additionally, they literally change their color about four times a second, flashing from an ivory white to a deep brownish red. “They’re actually hard to look at. They change color so quickly, it’s like a strobe is illuminating them. When you look at the sequence on film, it almost appears that the camera is

malfunctioning. Squid are there and then they’re gone. All of that plus the relative danger made for a tough shoot,” relates the director.

From there, team Deep Sea moved to the coast of California and eventually shot in three different places on and off the coast of the state. First stop was Catalina Island. There, they filmically captured the tiny powerhouse called the Mantis Shrimp; after the squid, the shrimp proved to be a welcome subject who, because of his “fearless” attitude, was more than ready to stand his ground (which made for easier filming).

The crew was able to document a face-off between the shrimp and a hungry octopus, intent on capturing and eating the shrimp. The prey had other ideas, however, and utilized his legendary, powerful front claws to dissuade the octopus from having him for dinner.

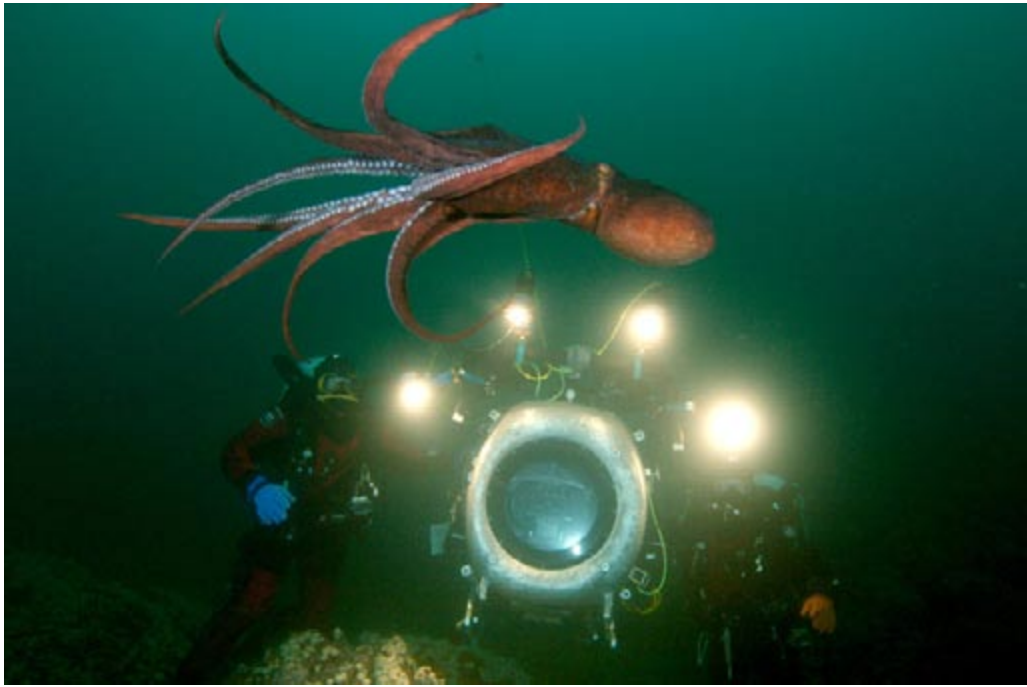
Hall was thrilled to have captured such an antagonistic encounter on film, which he knew would play even better with the IMAX 3D experience. He says, “I really love the Mantis Shrimp sequence—he’s quite spectacular. He does a display where he extends all of his appendages and stands up, which says to the octopus, ‘Careful, I’m dangerous, too.’ Eventually, he actually goes out with his claw and whacks the octopus a couple of times to scare it off. It looks

great in 3D—as you sit in the theatre it’s happening right in front of you.”

Utilizing the same boat, the crew moved on to The Breakwater off Monterey, where jellyfish were filmed, along with a multicolored thief called a Rainbow Nudibranch. A member of the sea slug family, the nudibranch has developed a singular relationship with the Tube Anemone—one that probably doesn’t thrill the anemone at all. At certain times, the nudibranch will stage a kamikaze dive attack, ripping tentacles from the anemone and ingesting them—the venomous stinging cells from the tentacles are transferred to the nudibranch’s defense system of venomous gills on its back. The anemone eventually grows replacement tentacles.

The team headed south to San Diego, where they filmed a scene of the incoming surf in La Jolla. Michele Hall explains, “We mounted the camera in the housing on a cart and wheeled it down the beach at La Jolla Shores; we tied a rope to it and pushed the housing into the surf line and let waves break over the top of it. That was a challenge, but the effort resulted in beautiful footage – and the film’s opening shot.”

Next stop, a special spot off Kona, Hawaii, to film a sequence the filmmakers call “The Turtle Spa.” In direct contrast to the relationships between Mantis Shrimp and octopus



A giant octopus swims gracefully above the IMAX® 3D camera in the cold waters of British Columbia. Photo copyright© 2005 Warner Bros Entertainment Inc. Photo Peter Kragh

and nudibranch and anemone, the symbiotic arrangement between the Green Sea Turtles and various Surgeonfish is one of mutual benefit.

Howard Hall offers, “These turtles come from long distances to this one spot in Kona, Hawaii, where reef fish will clean the algae off of their shells. If they didn’t do that and if the fish weren’t willing, algae would continue to grow and eventually the turtles would have a hard time swimming. They need this cooperative behavior in order to be healthy. And these fish benefit

because they get something to eat. There are lots of kinds of symbiotic relationships like that in the ocean, and it was our aim to show just how vital these relationships are. And it’s an absolutely beautiful sequence.”

Before departing the Hawaiian waters, cameras were also focused on the elegant and enormous Manta Ray, the harmless and gentle giant captured in a nighttime forage for food.

At the beginning of the summer of 2005, a change in location occurred, when production set down in North Carolina, along the 70-

mile Outer Banks of Cape Hatteras National Seashore. Offshore, 120 feet down, lies the remains of the Papoose, a ship sunk by a German U-Boat during the Second World War, which serves as the manmade and animal-adopted habitat of the Sand Tiger Sharks.

Filming in the deepest waters yet, Hall and company tackled the new challenges with their customary can-do attitude: “Certainly filming on the shipwrecks off North Carolina was really interesting work, because we were doing really deep dives and we were staying down for long periods of time. Our longest dive was in North Carolina; we were underwater for four-and-a-half hours. We spent two hours underwater at 120 feet, and then we had to spend two-and-a-half hours of decompression at the end of the dive. And we did that dive on four consecutive days.”

The crew immediately hopped south to the Bahamas, where production set down for close to a month and shot a wide range of sequences involving diverse groups of animals: Lemon Sharks, Caribbean Reef Sharks, grouper, coral reef and a litany of fish and other creatures who call the reef home. The filmmakers were also confronted by Tiger Sharks (not to be confused with the Sand Tigers), which do have an aggressive nature and have been known to eat

humans. Again, Hall did not employ shark cages, but instead, relied upon his years of experience to maintain safety during filming in the warm Caribbean waters.

The month of August brought a deadline situation, as the crew was committed to filming the annual coral spawning at the Flower Garden Banks National Marine Sanctuary in the Gulf of Mexico—which scientists have been able to pinpoint as occurring on the eighth night after the August full moon.

Filming such a once-in-a-year event, Hall and his crew took every precaution, going through a litany of “what ifs?” and coming up with failsafe measures to ensure that the coral spawning would be filmed. All equipment was put through quadruple checks and systems were a go just prior to the appointed spawning hour. With everyone and all the equipment ready to begin filming the sequence, and within moments of the spawning starting, the lights literally went out.

Michele Hall explains, “I was on the boat coordinating the deck-side activities, when Howard frantically notified me via his underwater communication system that the lights had suddenly gone out! At first, we thought it might be a blown fuse, but we quickly determined that there was a problem with one of the light cables.”

Luckily, Hall's preparatory steps had included providing an additional lighting cable chord, so the back-up was employed and there was light once again...just in time to capture the cinematic wonders of the night. Per Michele: "The divers had a back-up cable and lamp with them underwater, so we rigged it up just seconds before the coral started spawning. When we looked at the cable the next morning, we discovered that a barracuda had bitten through it—we have no idea what the result was for the fish, but thanks to preparedness and a fast-thinking crew, we got the shot."

A welcome break of a few weeks followed the shoot in the Gulf, after which everything shifted north to the final location in the company's year-long global trek: the waters around British Columbia, Canada. There, off the eastern coast of Vancouver Island, Hall and Cranston's camera captured swarms of jellyfish, several Wolf Eels and a Giant Pacific Octopus on the hunt.

To film these creatures, the divers and crew again faced a particular set of geographically related challenges. Howard Hall remembers, "Working in British Columbia was probably the most interesting diving that we did, because it was so technically difficult. Water temperature was as low as 46 degrees and the diving gear that we were using was even more elaborate

than what we typically use. All of the camera crew was diving with mixed-gas re-breathers—as we always do—heavy dry suits with lots of insulation under the suits. Instead of the usual air that is injected into the suits as an insulator, we injected argon gas, which insulates better. We wore full-face masks, so that we'd have better communication and also so that we could keep our faces warm, and dry gloves that went on with o-ring seals. It was all really complicated diving gear, in addition to this complex camera system that we were using."

Myers observes, "One of the amazing things about Deep Sea 3D is that you'll see astonishing creatures that could inspire science fiction. You couldn't invent these things. Our goal is really to take you on a magical journey underwater to places that most of us have never been—even with a large number of people who do scuba dive, lots of them have never met these characters or seen how they interact with other animals. What I would hope is that people will be delighted, awed, made to laugh as they meet these different characters...and ultimately, that they will be inspired when they leave the theatre to help preserve the health of our oceans."

Michele Hall adds, "This comes back to why we made the film. Besides dealing with the technical

challenges and enjoying getting out to dive, for me, being able to bring these stories and bring the ocean to life to people around the world is a very big motivation for getting out and doing the work."

The director acknowledges the moments of wonder, of beauty, of humor in the film, but also realizes that there is—in simply pointing out the interrelatedness of all of his subjects—an explicit theme to it as well.

He closes, "One of the things that people don't really seem to understand is the relationship between biodiversity and the health of the environment. The eco-systems work because of the interrelationships between the animals. It's very simplistic to think that you can just take an animal out of the eco-system and it's not missed. Remove one species, and many other species are influenced by that removal. Remove enough species, and the eco-system will actually collapse. In order for the system to work, it requires all these different animals cooperating with each other. When they're gone, the interrelationships are also gone.

"In the rainforest, in the ocean—it's the same thing. Coral reefs and various ocean habitats are communities of animals, and there are certainly predator/prey relationships that are important, but there are also

cooperative ones between species that are of critical importance. The message that we're trying to get out in the film is that biodiversity is important because these ecosystems are communities. When too many members are removed, the community goes."

But Hall is quick to add, "But when watching the film, none of this feels like medicine. We've made a beautiful, entertaining, funny film about the ocean communities. And I don't think you're going to believe what you actually are seeing when you watch it."



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