

The Evolution of Underwater Photography: From Scuba to Rebreathers

by Fernando Lessa

Underwater photography has always felt like a high-stakes game of cat and mouse: how quickly can I find my subject, and how long can I stay with it before the scene vanishes? But in reality, it's more than just a race against time; it's a complex balance of technology, science, and human physiology.

The desire to document the unseen underwater world is hardly a new pursuit. In fact, the initial challenge was simply to get a camera underwater—a goal achieved in the late 1800s. Early gear was rudimentary, and creativity was often limited by the functionality of the equipment. The holy grail was to stay submerged long enough to capture truly unique moments.

The Advent of Scuba Gear

The invention of diving suits—from basic rebreathers in the early 1900s to the mass popularization of scuba gear by Jacques Cousteau—was a game-changer for photographers. Equipment became more accessible, reliable, portable, and safer, offering greater freedom for underwater exploration. The 1990s saw further advances with the normalization of mixed-gas diving, enabling divers to reach greater depths and stay submerged for longer periods. What once felt impossible—dives lasting hours—have since become common and standard practice. Advancements in modernized



Sockeye salmon, fresh from the ocean, on their migration to the headwaters. Sony A7III Tamron 17-28mm f11 ISO 1600 flash Sea & Sea YS-D3. Northeast Coast of Vancouver Island, British Columbia. Canada

equipment have still not seen its limits, with some daring to dive for two-digit hours while maintaining relative safety.

How Did This Affect Underwater Photographers?

For underwater photographers, extended dive times are critical. Capturing those rare, hard-to-get shots often required patience. However,

photographers had to contend with limitations such as 36-exposure rolls of film, inefficient batteries, and bulky equipment prone to flooding or malfunction. While scuba gear allowed us to stay underwater longer, the technology of cameras couldn't keep up. Photographers often found themselves limited by their gear's inability to last as long as their dives.

The true breakthrough came with the popularization of digital cameras and lithium-ion batteries. This allowed photographers to spend



*Swimming below the fish and releasing no bubbles enables some pretty cool images. Sony A7III Sigma 15mm f2.8 + Sigma MD11 adapter.
Northeast Coast of Vancouver Island, British Columbia. Canada*

up to 1, 2, or even 3 hours capturing images—something that would have taken an entire day in the 1980s. Divers embraced the new technology, strapping on extra tanks and stage bottles, and the “astronaut” look became a familiar sight in the diving world. Today, it’s not uncommon to see divers so loaded with gear that walking or even scratching their backs seems a challenge. In cold-water dives, the sheer volume of equipment is staggering, with some even requiring lifts to get out of the water!

The combination of powerful cameras, long-lasting batteries, and

reliable gas supplies seemed like the perfect formula for underwater photography. But then, there’s the issue of exhaust bubbles. The moment you release them, all the marine life you’ve been photographing scatters away so much for that perfect shot.

The Challenge of Being a Professional Underwater Photographer

Being a professional underwater photographer adds another layer of complexity to the already difficult



*Remote locations are no problem for the RD1. For the weight of a single tank scuba rig, one can stay up to 4h, depending on the depth and the breathing effort.
Northeast Coast of Vancouver Island, British Columbia. Canada*

task. In addition to dealing with time constraints, gear failures, and unpredictable environments, there’s the pressure of consistently producing good results—images or videos that meet the expectations of clients.

In 2016 I moved to Canada to explore new horizons, including cold-water diving. Coming from the warm waters I was accustomed to, adapting to cold-water dives was challenging enough. But working professionally in this new environment presented additional unique difficulties. In tropical waters, I could easily walk around with a set of doubles, but in

cold waters, it became much more challenging with a dry suit. I had to account for air to inflate my suit, torches, heated undergarments, and—yes—pee valves, all while still aiming to return with quality images.

Soon, I found myself diving deeper into technical diving, and with it came the familiar “astronaut” look, as I strapped on more and more gear. In just a few months, I accumulated more certifications than credit cards. But despite all the gear, I found myself barely able to take care of the basics—like putting on my fins or dry gloves. My dives were limited not only by

the amount of equipment I could carry but by the sheer frustration of trying to work with technology that was decades old. The tipping point came when I found myself nearly purchasing a 60-year-old refurbished regulator just to have my bubbles released behind me instead of in front of my face.

As my career progressed and assignments grew more complex, the limitations of traditional scuba gear became even more apparent. The more equipment I had, the fewer times I could dive. How many tanks could I fit safely in my car? Filling tanks, dealing with inefficient gear, and watching as fish scattered the moment I released a bubble—it all became too much. There had to be a better way.

Enter the Closed-Circuit Rebreather (CCR)

Closed-circuit rebreathers (CCR) have been around for much longer than scuba gear. The concept of simple breathing in and out of a bag dates back to the late 1800s and was refined during World War I with an improved understanding of oxygen as well as carbon dioxide removal. While initially developed for military use, rebreathers remained largely in obscurity after the popularization of scuba gear, thanks in part to Jacques Cousteau's media efforts, though also the missing technology linkage - monitoring oxygen partial pressures via sensor technology that even today remains somewhat fickle.

Living and diving in the Pacific Northwest gave me the opportunity to see the evolution of diving gear firsthand. I began noticing rebreather divers more frequently, and the more I inquired about them, the more intrigued I became. However, the responses I received were often mixed—CCR divers were passionate about their machines but



Pacific Herring swimming by kelp forest. Small bait fish are known for avoiding bubbles and loud divers. The use of CCR enables the documentation of a more natural behaviour. Sony A7III Tamron 17-28mm f8 ISO 1600 flash Sea & Sea YS-D3.

quick to mention the drawbacks: they were bulky and expensive, the training was lengthy, and maintenance often required sending the unit to faraway parts of the world.

By 2021, my frustration with traditional scuba gear had reached its peak. I started diving deeper into the world of CCRs. After extensive research and countless emails, I took a discovery dive with a fully automatic CCR from a well-known brand. My life

changed that day. The fish didn't swim away. The silence underwater was profound. I could approach marine life like never before, and I had four hours of scrubbers and gas to work with—far more than my camera and video gear could last. It was everything I had dreamed of... until I came out of the water.

The machine was heavy, complicated, and full of blinking lights, cables, and gauges. I needed assistance getting in and out of it, and the



Sometimes, on a closed system, the fish be so confident that they get can get too close for the shots. Sony A7III Tamron 17-28mm f11 ISO 1600 flash. Babine Lake, British Columbia, Canada.

maintenance requirements were a headache. The final straw came when I learned that I couldn't train with a used unit until it had been inspected and upgraded by the manufacturer—despite it being fully functional and inspected just a year earlier.

The RD1 Solution

I knew that a CCR was the answer to my problems, but I also knew that the available options weren't quite what I was looking for. I wanted something compact, simple, and

without complex electronics. I needed a unit that could withstand the demands of real-world use and could be serviced easily, preferably with just a basic diver's tool kit.

In 2022, I came across an article in InDepth Magazine by fellow journalist Michael Menduno, featuring a CCR buyer's guide. As I skimmed through the guide, one machine caught my eye: the Rebreather Day 1 (RD1). According to the article, this machine had been tested in commercial diving environments, including seafood harvesting, which



Once fish realize you are not dangerous, they will simply not care at all about your presence. Sony A7III Tamron 17-28mm f8 ISO 1600 flash. Babine Lake, British Columbia, Canada.

was a good sign of its durability.

After visiting the RD1 website, I was intrigued. The gear was fully manual—no batteries, lights, or beeps. It was back-mounted, which made sense for carrying a large camera. I could assemble and disassemble it in the field, and it was easy to service, with parts made from commonly used diving gear. Best of all, the price was a fraction of what I would pay for a “famous brand” machine.

A few weeks later, I was on a plane to Rhode Island, meeting the “crazy scientist” behind the RD1

to begin my training. Two years later, with over 200 hours on the RD1 in both ocean and freshwater, my underwater photography has transformed. I can approach marine life in ways I never thought possible, hear sounds I didn't even know existed and stay underwater as long as I need to (at depths ranging from 10 to 60 feet). I can easily carry enough gas and scrubbers for 24 hours in my car and handle most issues, which are incredibly rare, with a simple diver's toolkit. If I'm working in shallow freshwater - like filming salmon - I can



*Large fish can get pretty comfortable and get very close.
Sony A7III Tamron 17-28mm f16 ISO 1600 flash Sea & Sea YS-D3.
Morice Lake, Smither, British Columbia, Canada.*

easily do 4h underwater with a full canister and 2 small 2L of air and O2.

What I learned through training on CCRs, is that all rebreathers are basically the same - breathe in and out of a bag, remove CO2, and add oxygen - though specific configurations, build quality, and features are a reflection of its developer's experience. In this case, the RD1 developer's diving style aligned with my own, being to go to work in a repeatable fashion, work the equipment hard, and not want to deal with the finicky details that often come with the technology. Mind saying that assembling, cleaning and doing basic maintenance is quite straightforward

since the system mostly uses common scuba parts and gear.

Using a rebreather specifically the RD1 has changed not only the way I dive but the way I work. For the first time in years, I feel like I have a system that enables me to dive for longer, safer and in a streamlined fashion. I've changed my connection with the underwater environment, and now I can feel I'm part of it, and not just a visitor. I don't need to look for the fish. I can now wait for the fish!

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