

a Web-zine

# UNDERWATER

## *Journal*

Explore • Discover • Challenge



**Stingrays • Rainbow River • Pulley Ridge • U-352 • Reef Squid • Subal CD5 • Rapid Diver**

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# THINKING ...

## *Outside the Bowl*

There's an old Chinese curse that states: "may you live in interesting times." For divers, this is certainly a period of interesting times. From the new realities of international travel to concerns for the effects of global warming and reef degradation, it's enough to make you wish for those simpler times when diving was considered dangerous and sex safe.

But you can't go back, and I'm not sure I'd want to. Some say the sport enjoyed its golden age from the late 1980s to the mid 1990s. I disagree.

To prove my point, I will cite another Chinese saying favored by Zen masters: "to a hammer, every problem looks like a nail." The wisdom of this proverb is that we all tend to filter reality through our personal experience and understanding. And so, when I consider the current state of diving, I often relate it to my own passion and career in the field - transitioning from a gung-ho hunter as a teenager, to indulging my growing love for the sea by hanging up my spear gun, for more serious interest in marine biology and underwater photography. With my increased knowledge came an increased appreciation for the ocean and all its inhabitants.



Since 1984, my endeavors have served me well enough to delve into many oceans and come face to face with some of the planet's most awesome marine creatures. In the process the thrill of documenting them and the places they live in for a host of publications.

In the world of photography, I watched tools of my trade change from simple Nikonos 35mm camera bodies to more sophisticated housed SLR systems with auto focus lenses and TTL metering for flash photography. But, just when we thought it couldn't get any better along comes digital.

The first I would give the most credit for really showing the underwater photography community where we were heading in the 21st century was a little 3.11 mega pixel SLR from Canon called the D30.

Substantially smaller, and lighter than anything out there, housing manufacturers in Europe and Japan saw the D30 as a more favorable choice to go underwater. Now, as we enter our sixth year in the digital realm, what has come available is staggering. From dead-simple point-and-shoot digitals to high-end professional rigs offering unprecedented levels of performance, render choices and possibilities never before imagined.

And so it is for the sport of diving in general. At the start of the 80s, most divers would aspire to little more than obtaining their open water certification, or maybe work up to divemaster, then take one or maybe two trips annually to some exotic destination. By the 90's, dive travel was commonplace, but the scope of most underwater activities was the same: two dives, by the numbers, with maybe a third after lunch if the repetitive tables allowed.

Dive computers opened up new freedoms, as did the increasing acceptance of nitrox and oxygen for decompression use. The tech diving movement gave divers not only the permission, but the tools needed to push deeper, farther and longer than ever – or to simply enjoy their dives with a greater degree of understanding and safety. Rebreathers proved a godsend not only for the ragged-edge explorers, but also for photographers and fish watchers who have learned the value of silence and stealth.

And who out there is not without a notebook or desktop computer.

The advent of the net has open doors beyond count, allowing the exchanging of ideas and information once left almost exclusively to clubs and magazines, now channeled through forums, blogs and webzines.

Where am I going with this? The web of course. After 25 years of dealing in the printed page, like those walking around with eyes wide open, I see the internet is the paragon of things to come, and come they will. We are undergoing an exciting period of change, and as the sport continues to evolve and grow, we will be presented with a host of new and exciting challenges.

Indeed, these are truly interesting times for divers. ❖

*Walt Stearns*  
*Editor-in-Chief*

## 2,000 FEET - THE HARD WAY!

Imagine exploring a wreck at a depth of 1,000 feet, then surfacing without any decompression.

Once the stuff of science fiction, atmospheric diving suits are now in use by military and commercial divers around the world.

Resembling something close to a 1950's-era, B-movie robot, these diving suits could be more accurately described as anthropomorphic submarines with articulated joints that allow the operator to move and work at extreme depths while maintaining a one-atmosphere internal pressure.

Following the sinking of the Russian submarine Kursk, in which 118 sailors perished after being trapped underwater for a week, the U.S. Navy placed an increased emphasis on the development of a new, highly advanced generation of atmospheric diving suits which could be deployed quickly in the event of a similar emergency, providing both reporting and rescue capabilities.

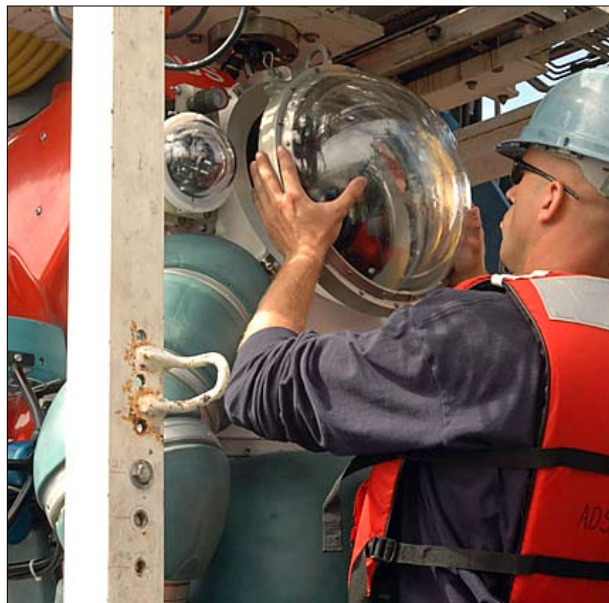
The project that became known as the Rapid Assessment Underwater Work System centered around the creation of a relatively compact hard suit that could operate safely at depths of up to 2,000

feet – nearly twice the depth of existing hard suits.

To develop this new system, the Navy turned to Ocean Works International of Vancouver, British Columbia.

The result was the Hardsuit 2000, which as the name implies, was designed to withstand underwater pressure at 2,000 feet.

That capability was put to the test last August, when Chief U.S. Navy Diver Daniel P. Jackson of Navy Reserve Deep Submergence Unit was tapped to perform a test dive to a depth of 2,000 feet off the coast of La Jolla, California.



▲ Chief U.S. Navy Diver Daniel P. Jackson being launched from the M/V Kellie Chouest for the certification dive of the Atmospheric Diving System (ADS) off La Jolla, CA.

◀ With final preps ago, Operations Specialist 2nd Class Par Larsson affixes the facemask of the Atmospheric Diving System (ADS) for Chief U.S. Navy Diver Daniel Jackson.



▲ Locked inside the Atmospheric Diving System (ADS) Hardsuit, Jackson eagerly awaits launch time for the first dive to be made to a target depth of 2,000 feet.

The test was successful, resulting in a new depth record for hardsuit diving.

"I feel like the luckiest guy in the world," said Jackson. "I am honored and privileged to be the first diver to go down to that depth."

The certification was the culmination of 11 years of planning, designing and testing by multiple agencies.

"This is the biggest piece of teamwork that I have ever seen in the Navy," said Cmdr. Keith W. Lehnhardt, the officer in charge of the project.

"The suit worked incredibly," said Jackson. "It did everything it was intended to do. I always heard that around 1,300 feet, the joints of the Hardsuit 2000 would work even better, and it worked exactly the way they said it would."

"At 2,000 feet, I had topside turn off all the lights, and it was like a star show. The phosphorescence that was naturally in the water and in most of the sea life down there started to glow," Jackson said.

"When I started to travel back up, all the lights looked like a shower of stars going down as I was coming up. It was the best ride in the world." ♦

*The special mission charter ship M/V Kellie Chouest is one of four Submarine Support Vessels belonging to the Military Sealift Command (MSC) Special Mission Ships Program.*

*Images taken by U.S. Navy by Mass Communication Specialist Seaman Chelsea Kennedy. Information and Images provided by Mass Communication Specialist 3rd Class Mark G. Logico, United States Navy.*

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# **UNDER THE RAINBOW**

## **Diving the Rainbow River, on the Cheap and Easy**

*by Karen Stearns*



**S**ometimes, you just need to be in the water. One of the simplest, most cost-effective, and yet thoroughly enjoyable ways I know to satisfy this aquatic craving is with a trip under the rainbow.

Rainbow River is one of Florida's finest clear-water spring runs, and remains a favorite destination for paddlers, tubers, swimmers and divers alike. A number of shops conduct check out dives in the deep holes located in the river's mid section, and on busy summer weekends, there may

be 100 or more snorkels and scuba divers fining their way downstream.

But diving the Rainbow under these conditions isn't seeing all it has to offer. After more than 30 trips to this north Florida favorite over the past decade, I've developed a simple routine that allows me to explore and enjoy the river on my own terms and my own timeframe.

For starters, I leave the tank, BC and regulator at home. Though there are a few sections of the river that reach depths of

20 feet or a bit more, depths of 5 to 10 feet are much more common, making the Rainbow perfectly suited for snorkeling. In fact, divers drifting through many sections will find they must stay at or near the surface to clear the numerous grass beds, and at such times, a heavy back-mounted tank can seem more hindrance than help.

A free-diving profile also liberates me from the scheduling constrains of the commercial operators who serve the river, allowing me to arrive early or late, avoid the crowds and spend as much time in the water as I want.

### **The Best Times**

A Rainbow River drift dive can be enjoyed any time of year, but my favorite times are weekdays in spring or fall, when boat and human traffic are sparse, air temperatures are mild and the sun is warm but not broiling. But even if crowded summer weekends are your only option, you can still enjoy a superior diving experience if you just know where to start and where to go.

The simplest scenario for gaining diving access is to drive to K.P. Hole County Park, which is located on the western bank of the river, about a mile and a half below the headwater springs. In summer, I like to arrive early not only to beat the crowds and the heat, but also to take advantage of the typically blue skies of morning,



◀ *For most visitors who come to play on the Rainbow River, canoes and kayaks are the tool of choice.*

A snorkeler enjoys the view of life both above and below the water's surface. The upper reaches of Rainbow River can take on such clarity it is difficult to distinguish the water from the sky.

while avoiding the cloud buildup of midday that can lead to afternoon thunderstorms.

KP Hole Park currently opens at 8 am, at which time there is typically ample parking close to the entrance gate and concession stand. I usually manage to find a shaded space under one of the big live oaks. Later in the day, dive groups and swimmers will fill this parking lot and the adjacent overflow area.

My dive bag is a small mesh backpack, which contains mask, snorkel, fins, a wetsuit and a waterproof Pelican-style case for keys, wallet, cell phone and other valuables. The river water is typically in the low 70s, which will mean a 3mm to 7mm suit for most folks, though I've grown accustomed to wearing a 5mm suit with about 4 lbs of weight on my belt, which takes just enough of the chill off to allow me to stay in the water for a couple of hours. If you opt for a thicker suit, but still want to free dive below the surface, you'll need to include appropriate weights.

One additional item you can't forget is some type of dive flag. More on that later.



Admission to K.P. Hole Park is currently \$3 per person, which includes the use of a swimming beach, changing rooms and picnic facilities. Your only other expenditure will be a canoe rental, which will run just over \$14 for the day.

It takes just a few minutes to procure a canoe and load gear aboard. It's a good idea to bring drinks, but be mindful of the river-wide ban on disposable containers which includes not only beer bottles, but also any type of glass or plastic soda or

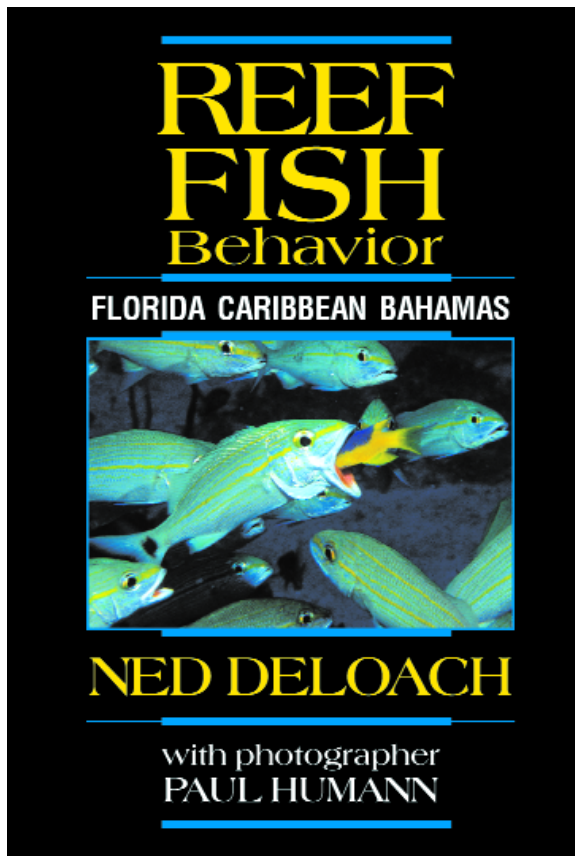
water bottle. Food and drink should be carried in cooler jugs or plastic storage containers, and there are hefty fines for non-compliance.

Once the canoe is loaded, I usually change into my wetsuit, but only to waist level to prevent overheating during the upstream paddle. Next, I stage the snorkel gear and marker flag in the center of the canoe, where they can easily be reached from the bow or stern seat.



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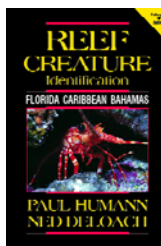
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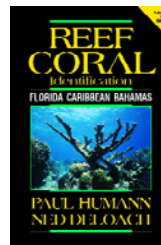
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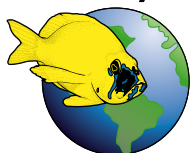
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## **The Price of Admission**

All good things come at a price, and the cost of a private drift of the Rainbow is paid in sweat equity. From K.P. Hole Park, it's about a mile upstream to the point where I begin my dives. The current is moderate, but it will take some steady paddling to make your way upstream – this is where it can be nice to have a dive buddy to share in the work. You can also lighten the workload by learning to read the river and staying out of the high flow areas in the center of the channel.

***A Rainbow River drift dive can be enjoyed any time of year. My favorite times are weekdays in spring or fall, when boat and human traffic are sparse, air temperatures are mild and the sun is warm but not broiling.***

If you've managed an early departure, river traffic will be minimal. By 10 am on most weekends, you'll be in the company of other paddlers, along with a few runabouts and fishing boats, and maybe the first of the pontoon boat operators ferrying a dive class. These classes – and many private boats – will stop just past the expansive mid-river grass flats located several hundred yards upstream of KP Hole. It is just to the east of these grass beds where you will find the river's deepest sections, which are obvious by their darker blue coloration.

Save this section for your return trip, and



instead keep paddling upstream. At this part of the River there is a shortcut through the small grass channel on the left (west) bank. This will shave several hundred yards off your paddle and puts you in less current.

Keep paddling right up to the point where the private homes on the western bank end, where you will find several "go no farther" signs along the banks and in the center of the channel. At this point, you will be within sight of the State Park that sits at the River's headwaters, but divers are not allowed to begin a drift dive from this park,

or to be in the water upstream of the signs.

Just before the signs, you'll notice an inviting picnic grounds on the left bank, but don't plan on going ashore. The facility is maintained by a nearby subdivision's homeowners association, and is private property. In fact, most of the river's western bank is private, while the eastern shore is wetlands. Rather than attempt to ease into the swamp or trespass, I simply don my gear midstream – which is why I put on the wetsuit half way before starting out.



◀ Large mouth bass, like this school of five-pounders, are among the several varieties of native freshwater fish found in Florida's inland waterways.

boils, which are actually small spring vents. Combined, these numerous upwellings disgorge some 500 million gallons a day of fresh water.

***In addition to the clarity of the water, the two features of the Rainbow that I most enjoy are the light and the fish life. Spend a minute watching dappled rays of sunlight play off the white sand bottom and you'll understand how Rainbow River got its name.***

With two in the canoe, it's best to take turns zipping up and donning gear. The only tricky bit is rolling overboard without tipping the canoe, which I have never considered a challenge, but could see how it might be difficult for some.

About the dive flag: it's required by law, and must be displayed. It's also a good idea, as there can be considerable motorized boating traffic on the river at times. If you are diving with a group and leaving someone in the canoe, you'll want to bring a flange-and-float combo that one of your group can tow.

I prefer to mount a flag on a short pole and leave it in the canoe, while carrying a dive reel that is attached to the boat's

bow painter. This arrangement allows me one-handed control of the canoe's drift, and when I want to linger, I can usually find a rock or log on the bottom to anchor the reel.

### **The Underwater Scene**

The pictures will do a better job of describing what awaits you underwater, and half the fun of diving the Rainbow is discovering your own favorite sites and sights. In general, the upper portions of the streambed alternate between thick, undulating grass beds and expanses of white sand punctuated by the occasional limestone rock formation.

At points all along the river, you see sand

Once you've grown accustomed to the view, start watching the fish. Bass, shell crackers and bream abound, and relaxed divers can usually find the lunkers lurking on the downstream edge of a grass bed – this is where snorkeling has the advantage over more intrusive scuba gear. Bowfin (aka mudfish) is another coming sight, as is turtles and various diving birds. On quiet mornings I've been fortunate to encounter a playing otter.

If you arrived early and paddled briskly, chances are you'll have the first quarter to half mile of the river to yourself. The farther downstream you progress, the more boat and diver traffic you are likely to encounter.

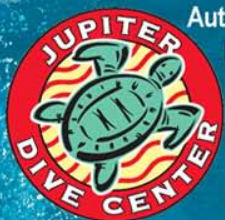
The commercial tour operators typically deploy dive classes and tour groups somewhere between the half-mile and one-

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mile points, and once you pass that first group, visibility will diminish slightly as activity increases. This shouldn't be cause to cut your drift short, however, as some of the river's more interesting features still await.

Divers holding to the western side of the stream will find a couple of larger spring vents, one of which looks large enough to squeeze into, though it's best just to look. The pilings and undersides of private docks also make for interesting exploration, as their shadowed recesses may hold larger fish. Be mindful of property rights and the exposed propellers of moored boats tied to these docks.

At the point where the river widens, you'll find the first of the deep holes over towards the eastern shore. This is a good place to practice your free diving skills, and there are a number of interesting ledges and undercuts down in the 20-foot range that will hold your attention. Again, on busy weekends, these deeper sections may be filled with one or more training classes.

The final stop on the tour is Garfish Hole, which is located in the middle of the large grass mats to the east of the deep holes. A depression in the sand bottom leads to a cavern at a depth of 15 feet that is large enough for a diver to enter and turn around -though this is not encouraged. Most times, you will see at least a few of the hole's namesake fish, but if you are lucky, you will witness a gathering of several hundreds of these prehistoric looking creatures, ranging up to 5 feet in length.

By this point, I've usually been in the

water for about an hour, and am ready for a surface interval. It's possible to make the one-mile drift in 30 minutes if you swim a bit, or to dawdle and spend two hours or more. If you or your dive buddy feels the need to get out of the water at this point, head for the shallow sandbars on the eastern side of the deep holes. Here you'll find a couple of downed trees that are usually adorned with rope swings, and can stand in knee deep water or beach your canoe in the bushes to warm up in the sun.

I've been known to paddle back for a second round, but most days, one trip down the Rainbow is enough, and I head home feeling renewed and pleasantly waterlogged. ♦





## PERSONAL BOATS

Boat owners can launch either from a ramp adjacent to KP Hole Park for a modest fee – though trailer parking is somewhat limited – or use the public ramp three miles to the south on Highway 41, just beyond downtown Dunellon. From there, it's a short run up the Withlacoochee River to the intersection with Rainbow River.

## CHARTERS

If you aren't into paddling, gearing up and exiting from a canoe or small boat, or simply prefer to let someone else drive the boat, there are a number of commercial operators who provide individual or group charter trips, mostly aboard large, shaded pontoon boats. A list of operator links is provided below.

## BOAT RENTALS

In addition K.P. Hole Park's swimming beach, changing rooms and picnic facilities, the park also offers canoe rentals (large enough for two, possibly three snorkelers with gear) for approximately \$14 for the day.

If canoe's are not your flavor, a second option is to rent a powerboat from Angler's Family Resort - 352 489 2397, which is located on Highway 41 just north of the Withlacoochee River Bridge. Rental rates for an outboard powered skiff run \$35 half day/\$65 full day. The facility also offers 7, 9 and 13 passenger pontoon rentals for \$125 to \$300 depending on size and duration (half or full day). Either of which would be a better choice if your plans include bringing scuba gear.

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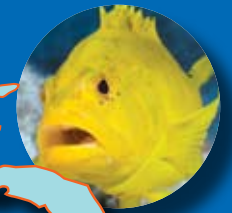


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# When Is Close Too Close?

*Crocodile Hunter Steve Irwin's Tragic Death Highlights the Importance of Respecting a Marine Animal's Natural Boundaries*

by Walt Stearns



**I**t was about the 10<sup>th</sup> day into the shoot for **Discovery Channel/Animal Planet's** new television project "Ocean's Deadliest," with Steve Irwin and Philippe Cousteau. Steve's expedition yacht *Croc One*, was anchored near Batt Reef, in the remote northeastern region of the Great Barrier Reef. Things were going well, and Steve decided to take one morning to shoot a segment on stingrays up in the shallows. Although this animal was not part of the Deadliest series, Steve felt the

rays would make a good segment in a separate television program he had been working on for his eight year old daughter, Bindi, to host.

Kin to sharks, stingrays belong to the family of cartilaginous fish *Dasyatidae*. And it's a big family at that, with 70 different species scattered around the world's oceans and even into the inland reaches of South America's mighty Amazon and Orinoco Rivers. Stingrays are most common in the tropical Atlantic and tropical western

Pacific, including Australia. On the Great Barrier Reef, the assortment of rays varies from the flamboyant blue-spotted ribbontail (*Taeniura lymma*) with its incandescent blue spots, to the large gray behemoths like the smooth stingray (*Dasyatis brevicaudata*), which have recorded eight feet (2.4-meters) in diameter.

Working in the shallows of the reef on snorkel, Steve and his underwater cameraman found a large smooth stingray and went to work.

Then the unthinkable happened. With a sudden upward arch of the ray's tail, the 44-year-old Croc Hunter was struck a fatal blow in the chest.

Like so many that watched the news September 4<sup>th</sup>, 2006, hearing Crocodile Hunter Steve Irwin was dead, killed by a stingray, came as a shock to me. Not just by the fact that Steve was dead but also by the way that it happened. Critics of Steve will say he had it coming through his reckless behavior with dangerous animals.

***“If they want to, any animal has the ability to cause some form of damage.”***

*- Guy Harvey*

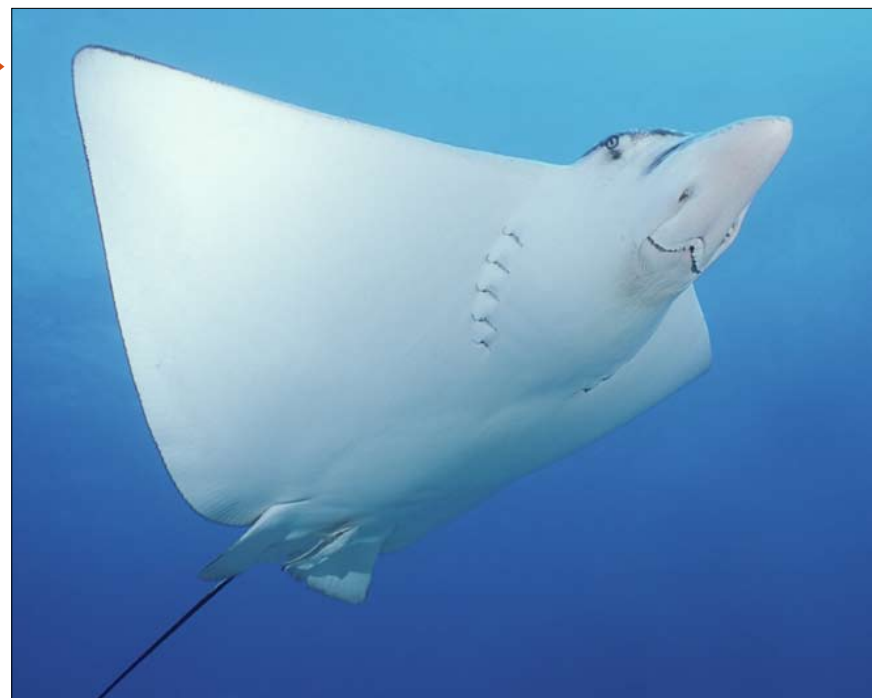
Three months later I still find the tragic event that took this popular television personality's life difficult to wrap my brain around. A freakish accident to be sure, but here it was a man famous for his exploits with crocodiles and extremely dangerous reptiles, dealt a mortal blow from something most divers had come to perceive as an innocuous marine creature.

### **Shades of Gray**

Stories of people involved in serious altercations with marine animals make terrific fodder for the media. In Steve Irwin's case, news of his death went global; with some commentators drawing their thoughts and points of view subjectively rather than objectively. In the first series of interviews, including those with Irwin's friend and

*Unlike stingrays, which have their barb midway down the tail, eagle rays and their relative the cow ray, have their barbs (as many as five) located at the base of the tail.*

*Manta rays (Manta birostris) have no stinger at all. Instead, these giants, like the one below from the Eastern Pacific, rely on size and speed to escape predators.*





producer, John Stainton, the fatal incident was described as being unprovoked. Steve and his cameraman, according to Stainton, were snorkeling across Batt Reef in shallow water and “he [Irwin] just swam over the top of the ray and the barb came up and hit him.”

In the days following, Stainton and crew viewed the footage of his friend’s last moments to glean a better understanding of what precisely happened. In subsequent interviews, Stainton described the images as “shocking. It’s a very hard thing to watch because you’re actually witnessing

somebody die...”

From John’s description, the footage clearly shows Steve swimming above a large smooth stingray (*D. brevicaudata*). As Steve passed over the ray, the footage reportedly shows the ray rising and making a turn, while at the same time it raised its tail and hit Steve in the chest. The last few frames showed Irwin removing something from his chest before passing out.

“There was no blood at first, it was not that obvious ... next minute he’s gone. That was it. The cameraman had to shut down,” said Stainton.

## Examination of the Weapon

Hearing that someone was “stung” by a stingray makes most people envision the offense to be something like a bee sting. That might be the case with a very small ray, but certainly not with a large stingray.

The “stinger,” or barb as it is more correctly referred to, is comprised of a stiletto-shaped bone appendage with two razor sharp, serrated edges. Designed exclusively as a defense weapon, the barb does the most damage after it has successfully been lanced into the flesh of a rays’ perceived attacker, snagging tissue on its serrated edges. On most species, the barb is generated in the animal’s tail, much like our own fingernail, and therefore detachable when used during an attack.

The size of this weapon is usually proportional to the size of the ray. The barb on an adult yellow stingray (*Urolophus jamaicensis*), a common species to both the tropical Atlantic and Caribbean, that grows no bigger than 12 inches in diameter, will measure less than an inch. By contrast, the ocean’s two largest species, the smooth stingray (*Dasyatis brevicaudata*), native to Australia, and the Atlantic roughtail stingray (*Dasyatis centroura*), with body measurements that can exceed 8 feet (2.4 meters) in diameter, produce barbs equal in length to a ballpoint pen.

As nasty as all this sounds, understand that the stingray barb is designed for defense; it is **not** an offensive weapon used for hunting.



◀ This 4.5-inch (115 mm) spine, was taken from the tail of a large, five foot southern stingray. Positioned midway down a three foot long tail, this stiletto-shaped barb is more than capable of inflicting a deep, penetrating wound.



## Too Close for Comfort?

To some, the tragedy could be palmed off as a case of “he was in the wrong place at the wrong time.” During a conversation two weeks later with marine biologist and artist, Guy Harvey, on the topic of stingrays, we hit on the subject of what, or might have happened with Steve Irwin. Guy’s perspective: “Steve was desperately unlucky. That thing could have gotten him anywhere else in the body and he would not have succumbed.”

**“Many people forget that the stingray population at Grand Cayman’s Stingray City is highly conditioned to people.”**

*- Guy Harvey*

We all know about the Croc Hunter’s zealous penchant for getting extremely close to some of the planet’s most dangerous reptiles. On Animal Planet, there wouldn’t be a week that went by we didn’t see Steve, dressed in his trademark khaki shorts and shirt, leaping on the back of a large crocodile or hovering perilously close to a highly venomous snake. Between his rapid-fire bursts, thick Australian accent and ebullient candor, he was fun to watch. But it does beg the question; when is close too close?

For anyone who has participated in a stingray encounter at sites such as **Stingray City** and **Sand Bar** in Grand Cayman, it’s difficult to imagine these animals as killer. Divers and snorkelers from around the world come away from these encounters with fun filled memories of swimming, hand feeding,

*Spanning four to five feet in diameter, the large southern stingrays (*Dasyatis americana*) at Grand Cayman’s Stingray City are adult females.*

*What most divers mistake as juveniles (pictured below the snorkelers) are actually adult males. For the male of this species, two feet across (wingtip to wingtip) is as big as they get.*





▲  
The Atlantic rough-tail stingray (*Dasyatis centroura*) gets its name for numerous sharp thorn-like projections (like those found on the stem of a rose) covering the length of its tail. The second of the world's two largest species of stingrays, this animal has a reputation for little tolerance when being crowded, especially by divers.

The wingspan of this specimen photographed in the waters off North Carolina measured close to seven feet across.

**“When we are in their company, I remind myself that, with my camera out front and fins stretched out behind, in their eyes, I am a very large, imposing-looking creature. This can, and often does create tension.”**

- Guy Harvey

even cavorting with the rays. Magazines have hailed Stingray City the “most fun to be found in 12 feet of water.”

“What a lot of people forget,” Guy points out, “is that Grand Cayman’s Stingray City ray population are highly conditioned to people. The level of interaction that takes place is, of course, extreme. Each year, these rays, most adult female southern stingrays (*Dasyatis americana*) are exposed to daily contact and handling by hundreds of thousands of people.”

From my own travels to the Caymans, I am often amazed by the tolerance these animals have developed for the actions of even the most gung-ho divers, who believe they need to grab hold of a ray rather than just provide them chunks of fish and squid.

Guy states that, “to my knowledge, in seven years I’ve been here, I have only heard of a couple injuries involving a person actually getting stung.” Painful as those experiences may have been, none have ever been remotely life threatening. Furthermore, when these accidents took place, more often it’s the fault of the swimmer, not the ray.

In addition, Guy clarifies that the behavior of these rays is not typical for this species or any other, evident by the fact that “they will bite you! But, that’s only because they’re hungry.” In fact, quite a few divers have gone home with what most jokingly call a “stingray hickey.”

Guy’s own interaction with the island’s prestigious aquatic celebrities goes well beyond the norm. “Right after I moved to

Grand Cayman, I became highly intrigued by these rays in how they associated themselves in large foraging packs," he says. "By contrast, their counterparts outside the protective shallows of North Sound share the same solitary behavioral traits as those found through the rest of the Caribbean."

Like many underwater professionals, both Guy's and my work has put us extremely close (at times within touching distance) to a variety of marine animals that are, or could be called dangerous. From Guy's own experience jumping in open water with large billfish and tuna, he admits "most of these animals, if they want to, have the ability to cause some form of damage."

Call it what you will - tolerance, curiosity or acceptance, marine creatures on a whole possess a different sense of what we define as personal space. Which is why it's often easy for many people to swim up within touching distance to marine creatures like whale sharks, giant mantas and sea turtles. If the animals do not feel threatened, the encounter may last for several minutes; if not, they swim away. No harm, no foul. Try that with a wild bison in Yellowstone National Park, you're like going to

be on the eleven o'clock news as another idiot that got gored by the large herbivore.

While those in the aquatic realm might display more tolerance when it comes to having their personal space encroached upon, there is a limit. "When we are in their company," Guy says, "I remind myself that - with my camera out front and fins stretched out behind - in their eyes, I am a very large, imposing-looking creature. This can, and often does create tension."

Even without the opportunity of seeing that Croc Hunter's footage for ourselves, it doesn't take much imagination to draw an image of how this tragic event might have played out.



## Guy Harvey Research Institute

Artist Guy Harvey has been intrigued by the behavior of Grand Cayman's stingrays ever since he moved to the island. He has made the study of these animals an ongoing personal project. Through his association with Nova University's Southeastern Oceanographic Center in Dania Beach, he has created the [Guy Harvey Research Institute](http://www.nova.edu/ocean/ghri/index.html). With the assistance of two graduate students and volunteers, Guy has undertaken a comprehensive program to study the population and ecological dynamics of Cayman's prestigious celebrities. [www.nova.edu/ocean/ghri/index.html](http://www.nova.edu/ocean/ghri/index.html).

An advertisement for Olympus Dive Center. The top section has a light background with the phone number 1-252-726-9432 and the slogan "The Better Way to Dive North Carolina" next to a small image of a boat. The main part of the ad is a blue gradient with a list of services: Charters, Training, Beginner to Instructor, Wreck Diving, Shark Diving, and \*NEW TECHNICAL DIVING DEPT.\*. The bottom right corner contains the address 713 Shepard St. Morehead City, NC and the website www.olympusdiving.com.

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## Tempting Fate For The Perfect Shot

In most such scenarios, the photographer or cameraman would take a position in front of the ray, while the second diver would take an approach from either the rear, or the right or left flank. Placing any wild animal in this type of axial position will violate its comfort zone and put the threat meter deep in the red. And as Guy points out, once an animal begins exhibiting a defensive posture, there will be only one of two outcomes – flight or fight.

To the untrained eye this defensive posture is subtle. From a rested position in the sand, the leading edge of the ray's wing tips will curl off the bottom slightly, while at the same time its tail will tense, sometimes lifting free of the bottom.



From this position, the ray's departure will be an explosive sharp turn followed by (when it feels threatened) a swift upward arc of the tail.

Even in full flight, the ray can effectively brandish its defensive weapon each time it makes a sudden pivotal turn, allowing the tail to sweep with a motion similar to someone throwing a sharp upper cut or right hook.

For anyone hapless enough to be inside the reach of its tail, well... from John Stainton's description of what he saw take place in the footage, Steve and his cameraman likely had that ray in such a position that it simply responded as any perceivably threatened animal would.

Freak accident or not, what should be learned from this sad situation is that when we invade an animal's personal space, be it a stingray or anything else, expect some form of reciprocation. Former test pilot Steve Yaeger couldn't put it better: "There are old pilots and bold pilots, but no old, bold pilots." Complacency can kill. ❖



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## What Are Your Chances?

Unprovoked attacks by stingrays are very rare. By nature, stingrays are usually shy and unobtrusive. When an attack, or more accurately, a retaliation, takes place, it is the ray's instincts telling it, 'Hey, I'm under attack!' Most retaliatory strikes on humans occur when someone steps on a ray while it's buried in the sand, or frightens the ray while it is rummaging the sea bottom for food.

Due to the barb's location half way down the tail, and not on the end like a scorpion, the only way this weapon can be wielded effectively is when the attacker is extremely close – as is always the case with waders. For a scuba diver or snorkeler to receive the barb, they would most likely be crowding the animal from above at a distance of three feet or less.

The number of deaths worldwide caused by stingrays over the last 20 years is fewer than 17. Most of these fatalities can be attributed to the small, yet more toxic-loaded species over their larger kin. Yet, though fatalities are rare, stings are relatively common, with the largest percentage involving people wading through shallow water, to which the injury is localized to the feet or lower legs. Most traumas caused by the barb of the stingray are non-lethal, although the aftermath can be both agonizing and horrific.

What happened to Steve Irwin is not all that much different than being stabbed in a vital organ with a steak knife. Interestingly, this has taken place only three other times in Australian waters. The first in 1945, again in 1969, the last in 1990 where a fisherman off Cairns was found on deck of his fishing trawler with a stingray barb through the heart. ❖



## What To Do If You Are Stung

With the majority of stingrays, the physical shape and construction of the barb does most of the damage. But, for added measure, the barb carries a toxin, as well as certain bacterium that help send the message a little deeper by causing the affected tissue of the attacker to react more violently. In a small percentage of stingray species (usually small varieties that have to overcompensate) the barb is equipped with a pressure-activated venom sac below its base. When the barb is jabbed into the flesh, the toxin is injected in the same fashion as a hypodermic syringe.

Fortunately, this toxin is a large protein that can be easily broken down by heat. The most common and effective form of first aid is immersion of the wound in hot (non-scalding) water (110° to 113° F) for 30 to 90 minutes. With some stings the effect is almost immediate. Afterwards, treatment involves removing the stingray barb (as well as any broken bits) before cleaning with soap and water, followed with lightly bandaging the wound. It is highly advisable to see a doctor as soon as possible, especially since antibiotics may be needed to ward off infection.

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*Deep Secrets*  
**UNRAVELING  
THE SECRETS OF  
PULLEY RIDGE REEF**

*by Tim Taylor*



**I**n the depths of the southern Gulf of Mexico, some 100 miles west of Key West, there is a reef unlike any other. In 2005, I had the good fortune to be among the first divers to explore this amazing marine environment.

Since it's discovery in 1999, the Pulley Ridge Reef has changed the rules on coral reefs. Situated 250 feet or more below the surface, the corals of this reef grow at much greater depths than scientists previously thought possible, and may hold clues to the health and future of reefs worldwide.

The geologic formation on which the reef grows was first noted in the 1950's by a malacologist (someone who studies shells and mollusks) named Dr. Thomas Pulley. In the process of taking deepwater benthic samples, he came up with unexpected species of mollusks and bottom-dwelling life forms that were apparently living on a raised portion of the seabed located near the continental shelf.

◀ *Divers using specially blended trimix gas work together with the one-man submersible Deep Worker as a team, gathering sponge and coral samples atop the Pulley Ridge biosphere at 220 feet.*

This geologic feature, subsequently named the Pulley Ridge, was later identified as a series of drowned barrier islands that were dry land during the last ice age some 13,000 years ago. The site received little additional scientific interest until 1999, when a team of researchers from the University of South Florida and the U.S. Geological Survey discovered populations of tropical reef fish and live corals growing on the southern section of the Ridge. This created considerable excitement, because instead of the types of deep-water corals that form reefs in the dark of the ocean, Pulley Ridge Reef was home to photosynthetic corals – the kind that depend on sunlight and form the shallow reefs familiar to divers.

In the years since, research teams have made annual research trips to the reef in hopes of uncovering its secrets. Dr. Sylvia Earle brought her Deep Worker submarine (built by **Nuytco Research**), and researchers have used a variety of advanced remote sensing tools to map and study this unique find. But even with all this advanced equipment, the researchers eventually realized that an up-close and detailed study of the low-profile corals of this ecosystem would be far easier and more effective if done by humans.



## Diving Deep for Science

In recent years, the technical diving movement has changed the rules of scuba diving. The use of mixed gasses instead of air, oxygen and nitrox decompression mixes, and closed-circuit rebreathers has allowed explorers to explore at depths far beyond the traditional 130 recreational limit.

But while cave and wreck explorers have eagerly embraced such technologies, the scientific community has been slower to follow. I have assisted and trained a growing number of scientists on the use of nitrox gases for extended bottom times and rebreathers for projects such as shark research, where extended silent operation is critical to close observation and tagging work. But diving to depths well beyond 200 feet in an open-ocean environment, and performing in-water decompression was a whole different ball game.

Our solution was to find qualified technical divers and provide training on the specific techniques of survey and sampling that would allow them to gather data that could then be utilized by a number of different scientific disciplines – much like the Apollo astronauts who gathered lunar samples for subsequent study back on earth.

Jim Culter, a **Mote Marine** Lab scientist and accomplished deep diver, was given the job of gathering and training the divers, while I and my crew provided the expedition support vessel, the 65-foot exploration vessel **R.V. Tiburon**, and took responsibility for dive operations logistics, underwater video, and photographic documentation.

In conjunction with our diving efforts, Dr. Earle planned to return with her Deep Worker submarine, which would be supported by two additional research vessels, the *R.V. Bellows* and *R.V. Suncoaster*.

Our dive team assembled in Key West in June of 2005. The decks of the *Tiburon* were piled high with the trappings of technical diving. Several of us would use closed circuit rebreathers from **Inspiration, Evolution** and **KISS**, but others would use more conventional open-circuit rigs, which greatly increased our gas supply needs. In anticipation of these needs, we'd previously loaded an additional 43 large oxygen bottles aboard the *Suncoaster*.

On our first day underway, while still 35 miles away from our first dive site, we received a message from the *Suncoaster*, which was headed back to a safe anchorage in the Dry Tortugas. The captain informed us that the currents were just too strong to launch the sub and that they were going to wait a day before trying again. With months of planning and at least a week of work getting off the dock it was not the news we wanted to hear, but rather than discourage us, it made us more determined than ever to complete the mission.

Gathering the team, I briefed them on a drift dive plan that was designed to use



▲ Expedition Cameraman Doug Rice on an Evolution CCR watches the time go by during this final stop before exiting the water.



▲ **DOER** technicians service Deep Worker onboard RV *Suncoaster's* aft deck for its next dive.

the strong current to our advantage. The techniques of drift diving can be compared to dropping skydivers out of a plane. If the team members do not all go at the same time, they might potentially land miles apart.

But by dropping the divers from the moving boat all at once, they are able to descend and ascend as a team, with their path defined by the currents. One team member carries a long line with a small grapnel hook at one end and a large orange buoy on the other; the boat can then follow the buoy and stand-by during the several hours needed to perform the dive and the required in-water decompression. And because the float line is moving with the current, the divers won't have to fight the current during the lengthy decompression, as is sometimes the case with an anchored boat.

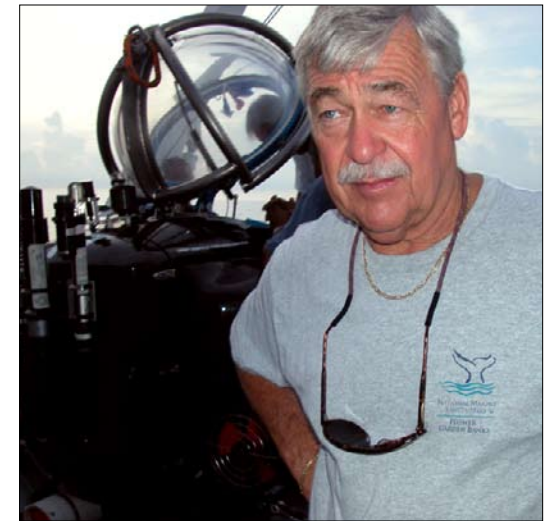
## The First Descent

Conditions were definitely in our favor when we undertook our initial explorations of the reef. The seas were calm, the weather mild and the target easy to find. Unlike a deep wreck, which is a small and often difficult to locate when deploying from a drifting boat, the Pulley Ridge Reef is quite large, covering more than 20 square miles of bottom, so locating a precise drop site was not critical. We were able to use GPS coordinates to launch the first team.

Because we were planning to work at depths of 220 to 230 feet, we selected a trimix gas blended with 11 percent oxygen



▲ Dr. Sylvia Earle piloting the Deep Worker at 230 feet, to collect samples and video divers working the ridge in the near twilight depths.



▲ Billy Causey, Director of SE United States Marine Sanctuaries, on deck with the deep worker.



◀ With a weather window that could not have been more perfect, the RV Tiburon links up with RV Suncoaster 100 miles west of Key West in the southern Gulf of Mexico.

G.P. Schmall, Director of the Flower Gardens Marine Sanctuary, entering the sub for his dive to Pulley Ridge. ▶





◀ Divers survey bottom littered with unique corals and sponges like this rare variety of black coral with branches resembling white lace.

leaf-like coral formations that were covered in a strange green algae and seemed to glow in vivid shades of purple.

The shape and color of the corals lead us to nickname the site the Cabbage Patch. In addition to these unusually sized and colored corals, we noted a wide variety of fish life that included giant red grouper, scamp, damselfish, angelfish, rock beauty, and hogfish. It was one of the healthiest reef environments I've ever seen.

But there was little time to admire the scenery, as our team had a specific list of tasks to accomplish. We took samples, ran transits, took photos and video, and collected a wealth of data.

All too soon, our bottom time was up, and we ascended to begin our hour-long hang before surfacing. A second four-man team was subsequently deployed to collect additional samples and take close-up photographs.

On the ride back to the anchorage in the Dry Tortugas that evening, the mood

▶ *MOTE Marine Safety Officer Brett Blackburn collects a few sponge samples for scientists more than 200 feet above onboard the RV Tiburon.*

aboard the Tiburon was one of surreal satisfaction. We basked in the knowledge of the historic moment. Not only had we been the first divers to touch down on Pulley Ridge, we'd shown that the techniques of technical diving had a viable role in the scientific process.

Over the course of three days, our 11-man dive team logged a total of 18.5 hours of bottom time. During a similar five-day period, the Deep Worker submarine, which required significant and expensive support infrastructure, logged 21 hours of bottom time.



and 50 percent helium for our bottom mix, with high-oxygen nitrox mixtures for decompression. This combination would allow us to spend 20 to 25 minutes on the bottom while keeping in-water deco times to 60 or 70 minutes.

Stepping overboard, we dropped steadily into the clear water. The bottom loomed as we neared 200 feet, then we dropped into a world unlike anything I'd ever seen. The low-relief reef was covered in oversized



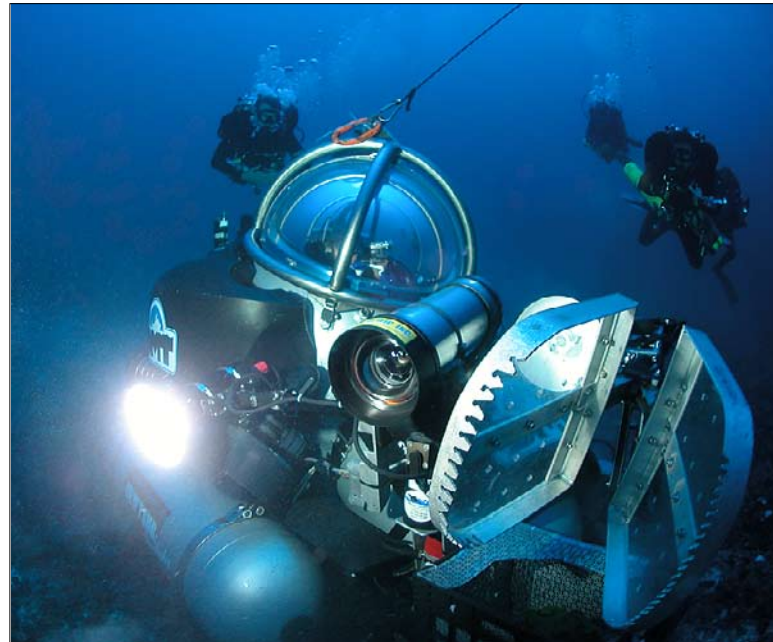
◀ Brett Brett Blackburn, Mote Marine Safety Officer, with the team on the deco line.

Pulley Ridge Expedition Team display their **National Geographic and Explorers Flag** (flag #139) for a group picture before getting underway back to Key West, Florida.

Deep Worker accompanied by the dive team completing their final descent to the bottom at 230 feet atop Pulley Ridge.



In addition, our dive team was able to collect a number of small and fragile samples that could not be obtained by remote sensing devices or submarine. All of our samples and information was subsequently provided to 24 scientists working in a variety of disciplines. Its nice to know that even with all the advanced technology available to ocean explorers, there are still times when divers can do it better. ❖



Additional information and photos of Pulley Ridge can be found at:  
<http://coastal.er.usgs.gov/pulley-ridge>

# MYSTERIES OF THE DEEP REEF

Scientists are still developing theories on how the corals of Pulley Ridge Reef can thrive at depths far beyond those at which photosynthetic corals are normally found. There are several factors that provide favorable conditions for growth. The warm, clear waters of the Loop Current pass over the reef, while the nearby continental shelf provides an upwelling of nutrient-rich water from the depths. To catch the maximum amount of available sunlight, the corals seem to have adapted, developing the thin, flat leaves that give this reef a unique look.

But these factors alone do not seem sufficient to explain the reef's ability to survive. Recent discoveries point to additional unique adaptations that are not yet fully understood. Among these findings is the identification of an algae called *Anadyomene saldanhae*, a plant that is more common in the 20 to 40-foot depth range. To find it growing at depths of 230 feet, where it receives only five percent of the sunlight that is normal at shallow depths is a phenomenon worth studying.

Far from being an isolated occurrence the large, brilliant green, meter-wide plant can be

found carpeting Pulley Ridge as far the eye can see. Could it have a role in supplying oxygen to the ecosystem allowing the corals to grow?

Perhaps even more intriguing is the presence of bioluminescent bacteria that may maintain a symbiotic relationship with the corals. Researchers stumbled across this bacterial strain while going through samples at night aboard one of the research vessels. The bacterial strains found at Pulley Ridge actually glow in the dark and range in intensity and color from a neon green to greenish blue, said Kim Ritchie, manager of microbiology research at Mote Marine Laboratory in Sarasota.

Corals have never before been shown to harbor bioluminescent bacterial symbionts. The glowing bacteria found on the Pulley Ridge corals might help the coral access additional light, Ritchie speculates. In addition, the bioluminescence in the bacteria might also be used to attract zooplankton, which is a coral food source. ❖

*A diver touches down among a field of *Anadyomene saldanhae*, showing brilliant green in the deep waters.*



▲ *The *Ventracosa* corals (pictured above) found on Pulley Ridge contain an algae that when seen by divers without artificial light, is reported to have a luminescent blue and purple hue. In the lab, the bioluminescence was discovered to be a result of a special bacteria.*

***“They’re incredibly spectacular. They light up the corner of my lab when the lights are out. . . it’s eerie.”***

*- Kim Ritchie, manager of microbiology research at the Mote Marine Laboratory in Sarasota., Florida.*

## Hope for the Future



by Tim Taylor

Like canaries in a coalmine, coral cannot tolerate dramatic environmental changes, and are therefore a good predictor of wider ecological troubles. In eight short years, the shallow reefs of the Dry Tortugas, which lie not far from Pulley Ridge, have seen as much as a 50 percent decline in living coral cover. Unfortunately, this is not an isolated or local phenomenon; all over the world, corals may be living their last days.

Over the past ten years and particularly in the last 18 months, I have supervised coral research expeditions aboard the Tiburon. I have worked with Scripps Institute of Oceanography, Mote Marine Lab, USGS (United States Geological

Survey), NOAA, EPA (Environmental Protection Agency), University of Texas, Nova University, National Park Service, Harte Research Institute, Florida State University (FSU), and the University of Miami to understand what coral was once like and what is happening to our reefs today.

Their studies attempt to find the cause of this decline; finding a cure is still not much more than a hope and a wish. Nevertheless, when asked, scientists agree that three things are the major factors affecting coral health globally: climate changes, coastal pollution

and development, and over-fishing. These factors all combine to radically alter the ecosystem and compound the stresses on coral reefs. According to the Nature Conservancy "coral reefs are currently one of the most endangered ecosystems on the planet. If the present rate of destruction continues, 70% of the world's coral reefs will be killed within our lifetimes."

The U.S. Geological Survey (USGS) in their Fact Sheet puts it this way--"[c]oral reefs are home to 25% of all marine species. However, the tiny colonial animals that build these intricate limestone masses are dying at alarming rates. If this trend continues, in 20 years the living corals

on many of the world's reefs will be dead and the ecosystems that depend on them severely damaged."

In May of 2006, two coral species in Florida and the Caribbean - Elkhorn (*Acropora palmate*) and Staghorn (*Acropora cervicornis*) -were the first corals placed on the Federal Threatened Species

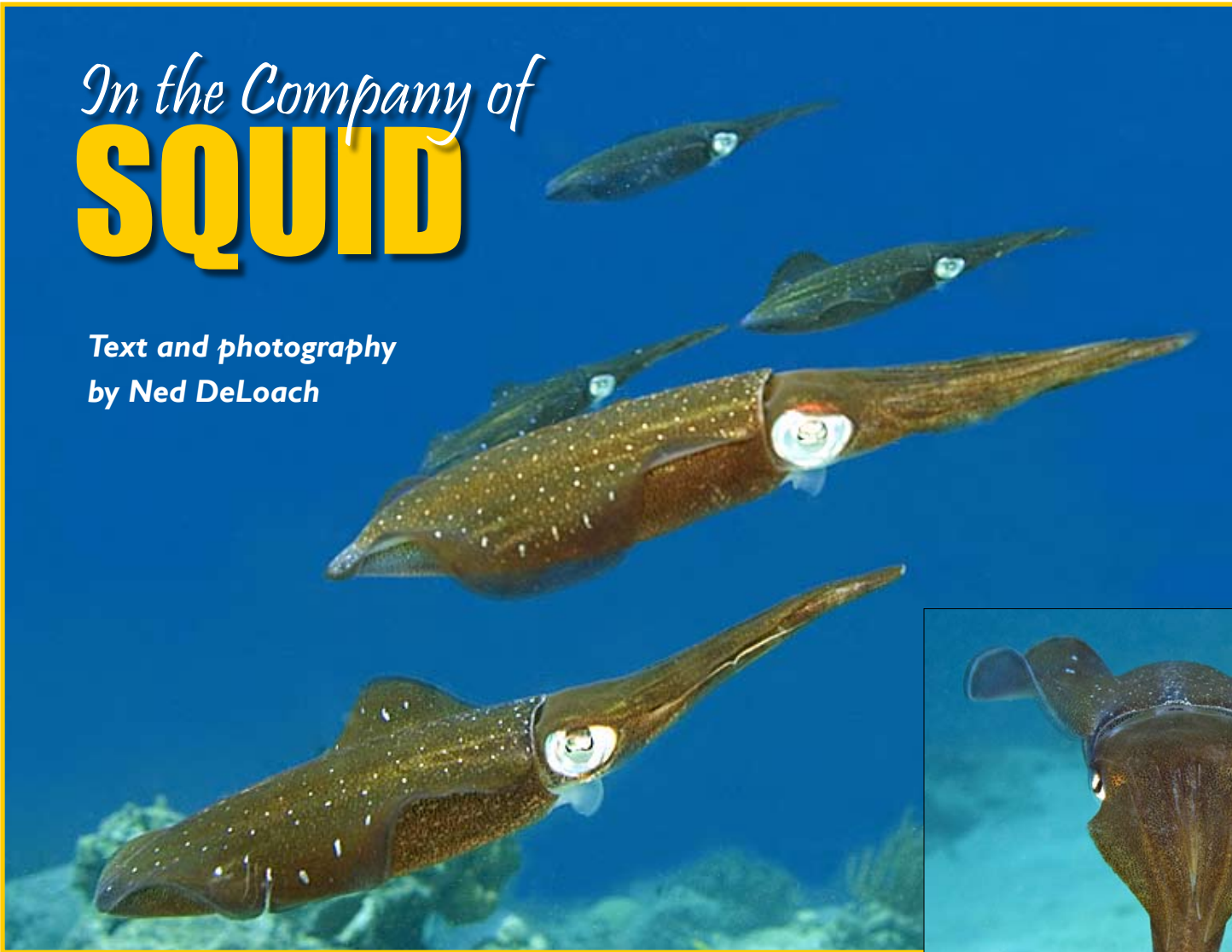


list because of dangers posed by human activity, hurricanes, and higher water temperatures observed across the oceans. The Elkhorn and Staghorn coral species have suffered a 97 percent decline in areas off the Florida Keys and in the Caribbean since 1985 nearly obliterating the species while the surviving 3 percent are hanging on by a mere thread.

The one thing that buoys my spirits is thinking back on the phenomenal discoveries made on Pulley Ridge – a reef seemingly devoid of disease and decline. Could this unique reef provide clues that could further our understanding of the health and sustainability corals? Can studying it help us save the shallow water reefs? Only time will tell. ❖

# In the Company of **SQUID**

Text and photography  
by Ned DeLoach



**C**ephalopods (octopus, cuttlefish and squids) are supposed to be the most intelligent invertebrates on Earth. For more than a week, my wife Ann and I had been watching a resident school of thirteen common reef squid on a shallow South Florida grass bed, and it seemed that they had come to recognize us, and possibly enjoyed

the company we provided. Like clockwork, each afternoon we would find our little friends grouped in picket line fashion, a behavior referred to as shoaling, hovering like dark ghosts above the seaward edge of the grass bed.

◀ *In the animal kingdom, there are no stranger or fascinating sea creatures than octopus, squid, cuttlefishes and nautilus (the latter two inhabit the waters of the Indo-Pacific). Belonging to the Phylum Mollusca, Class Cephalopoda these soft-body creatures make up close to 700 species worldwide.*

In the beginning of these encounters, our attempts to get close met with the squids' moderate withdrawal farther into the grass. Soon it became obvious it would be better to settle to our knees several feet away and observe the animals on their terms.

From a distance, we watched the baker's dozen rise and fall in the gentle surge. Every few minutes, two, three, or four squid broke ranks and jetted off together toward deeper water. Others, returning from parts unknown, would take up positions in the shoal line that lazily swayed at mid-water. It didn't take long before our patience was finally rewarded, as the shoal began inching almost imperceptibly closer. After several minutes, a vanguard of three had positioned themselves at arm's length, scrutinizing us through the black slits of their mysterious silver colored eyes.

Following their lead, the others finned forward until the entire group of eight- to ten-inch creatures surrounded us. As long as we move slowly, the squid seem comfortable in our company and remained near.

During one encounter, the entire shoal,

with seemingly no provocation suddenly blanched in unison, bolting en masse with surprising speed and leaving clouds of dark ink suspended in their wake. Following their departure route, we found the group nestled near the bottom next to a small patch reef with every eye trained on a passing barracuda. After the danger passed, the squid casually made their way back to their customary location, where they fell into formation, with larger individuals positioned as sentinels at each end of the column. For nocturnal hunters like these Caribbean reef squid, much of their daylight hours are spent alternating between tedium and terror.

Squid watching is at its best during courtship, which occurs within a shoal several times throughout the day and year-round. With the help of Roger Hanlon and John Messenger's excellent scientific text *Cephalopod Behavior*, we were able to make some sense of the squids' action-packed mating ritual, which can last over an hour.

The show begins with two to four individuals flashing body patterns and darting about. The courting party, composed of a single female and competing males, eventually separates from the shoal and rockets off near the surface. The dominant male, usually the larger, does everything he can to retain a favored position next to the zigzagging female while rival males tag close behind.

During the on-again-off-again chase, the reluctant lady blanches a series of bright hues, leaving a large dark blotch



▲ *Naturally inquisitive, by remaining still with their hand outstretched, like Ann's above, these two reef squid will often come within touching distance for a better look.*

*Two males square off, flashing the telltale zebra pattern to determine who is the most dominant.* ►

on the front of her mantle. When a rival male makes a challenge, both suitors come together, momentarily pause, flare arms and flatten, while the dominant male below exhibits a flamboyant zebra display.

After gaining the upper hand, the dominant male attempts to pacify the still contrary female by isolating her even more. To display control, he turns one side of his mantle dark. The dark side is always kept toward the female, while the light side signals a defiant "stay away" to the rest of the world. As she continues to swim away, playing hard to get, the male steadily works his way close to her side while at the same time creating a pulsing light show



***The name Cephalopoda is Latin for head-foot — appropriate for animals that have their heads connected to their tentacles — eight with octopus, ten with squid and cuttlefish, with as many as 50 with the Nautilus. Cephalopods possess the most highly developed brains among invertebrates, and have keen vision. Octopus, squid, and cuttlefish are all known to be astute problem solvers, as well as masters of escape and camouflage artists.***

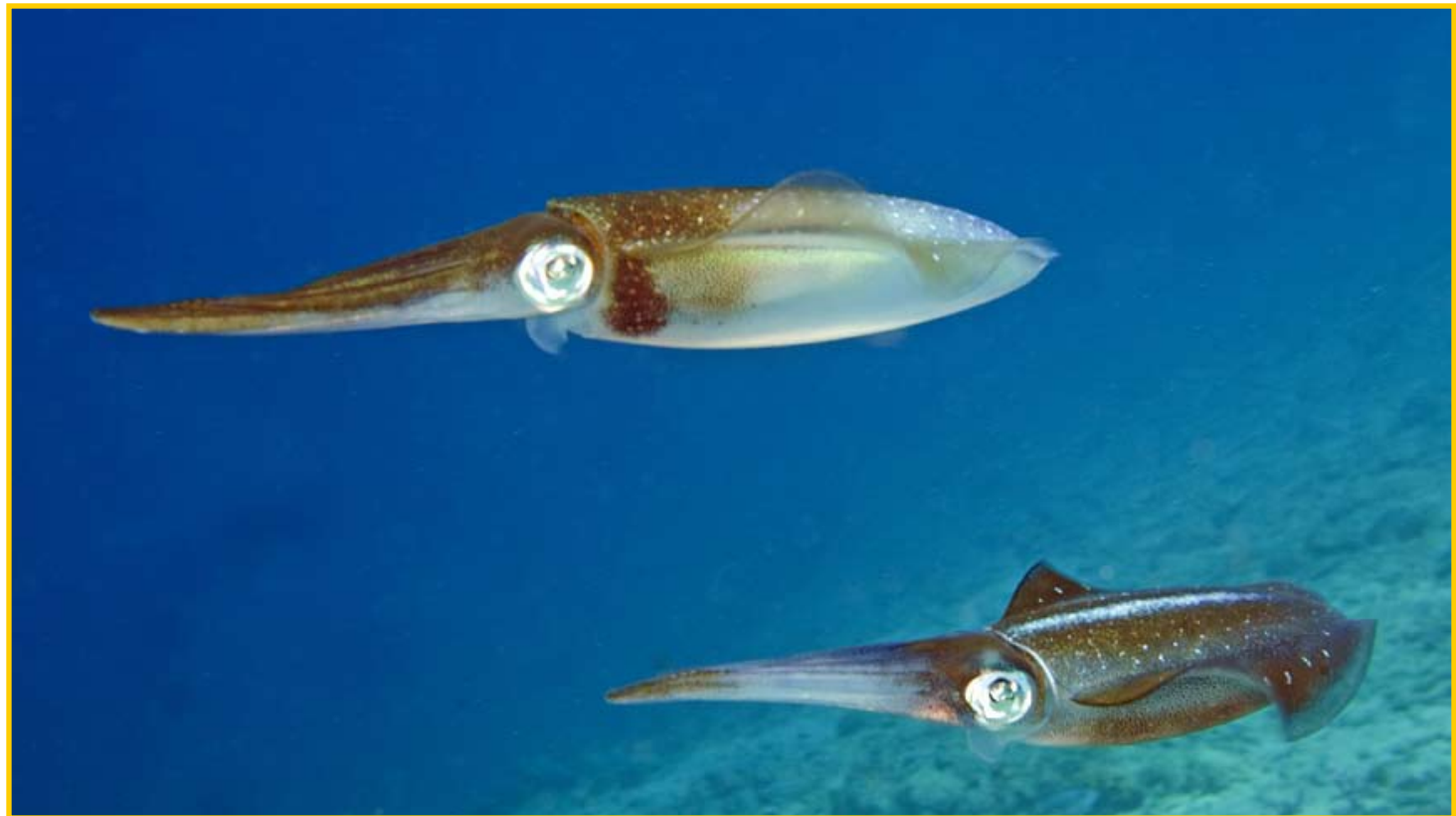


of sorts through the rapid flashing of his chromatophores.

Often the pair will rock back and forth side-by-side before – splat – almost as fast as the eye can see, he slaps a packet of sperm into outstretched arms near his lady’s head. If she accepts the gift, she stuffs the bundle into the seminal receptacle located below her mouth; however packets are regularly discarded.

A few days later, while exploring part of nearby patch reef, we sighted two squid acting a bit peculiar. The male who had successfully inseminated the female hovered in a defensive posture with its arms raised like the trunk of a trumpeting elephant closely above his love interest, while the female in turn moved low over a spot in the reef, repeatedly reaching underneath a small overhang. Once the pair left, closer

***Cephalopods have the amazing ability to instantaneously adjust the color density and hue of their skin. Known as chromatophores, these special pigment cells within their skin can transform their outward coloration from a dark, drab brown to bright red or pale white. With squid and cuttlefish, these chromatic skin adjustments can take on the appearance of a luminescent light show, through the animal’s ability to instantaneously contract, expand and adjust these cells so freely that their coloration can literally appear to pulsesate and flicker. Some researchers now believe that by utilizing such complex chromatic behaviors, cephalopods, like our little friends the Caribbean reef squid, *Sepioteuthis sepioidea*, may possess a basic language.***



▲ The dominant male (above) pursues a female (below) displaying her reluctance to mate through a series of bright hues, including a large dark blotch on the front of her mantle.

A male displays his two sides. ▶

A female accepts a male’s packet of sperm. ▶▶



inspection revealed the female had been attaching her translucent egg cases to the rock. Each case, the size of my little finger, will contain several embryos that over time will produce a tiny replica of their parents.

Unfortunately, on the eve of the sixth day in the company of squids, a storm rolled in, making further visits in the shallows impractical. When we finally returned, all that was left of the capsules were shredded bits. Our quixotic hope of watching a quarter-inch squid squirm free from its egg case will have to wait. ❖



*Unlike their sedentary and slow-moving relatives (snails, sea slugs, oysters and clams), cephalopods are active, highly mobile predators. A feature shared by all is the ability to rapidly draw water into their mantle forcing it out again through a funnel located under the head creating a form of jet propulsion. In the case of squids and cuttlefish, the end of this funnel can be manipulated freely allowing the animal to instantly jet off in any direction. Adding to their unique form of locomotion, squids and cuttlefish also feature a pair of thin muscular fins extending along each side of their mantles. With them, they can maneuver forward or back, or hover serenely in place.*


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An underwater photograph of the wreck of the USS U-352. The scene is set in clear blue water. In the upper left, a massive school of small, silvery fish swims towards the right. In the center and right, the rusted, skeletal remains of the submarine are visible, including a large conning tower and various structural beams. Three divers in full gear are seen in the background, exploring the site. The seabed is sandy and covered with some sparse marine life.

*Out There:*

# **The U-352**

*North Carolina's Ghost of War*

*Text and Photography  
by Walt Stearns*

**F**or a battle that was so well recorded, nobody knew the exact whereabouts of U-352. That is when Captain George Purifoy (owner of Olympus Dive Center), Rod Gross, Dale McCullough and Claude Hall (who started the search through extensive research of WWII naval archives) decided to seek the downed sub.

Their hunt went ten years, before U-352 was found April 1975, a full mile and a quarter from the original coordinates logged by the Icarus.

As most Atlantic wreck divers know, many of North Carolina's Outer Bank wreck sites were the result of the "Battle of the Atlantic." The most infamous in US history was the onslaught created by infamous U-bootwaffe (U-boat fleet) during the second world war.

During the war's early stages, Germany's marauding U-boats brought their ocean campaign right on our doorstep, and proved to be one of the most fearsome and effective weapons in the history of naval warfare. Under the command of Admiral Karl Donitz, Germany's U-bootwaffe launched its first series of strikes against American shipping in the final days of 1941. Known as Operation Paukenschlag (Drumbeat), the attacking force was comprised of five IX class, long-range boats.

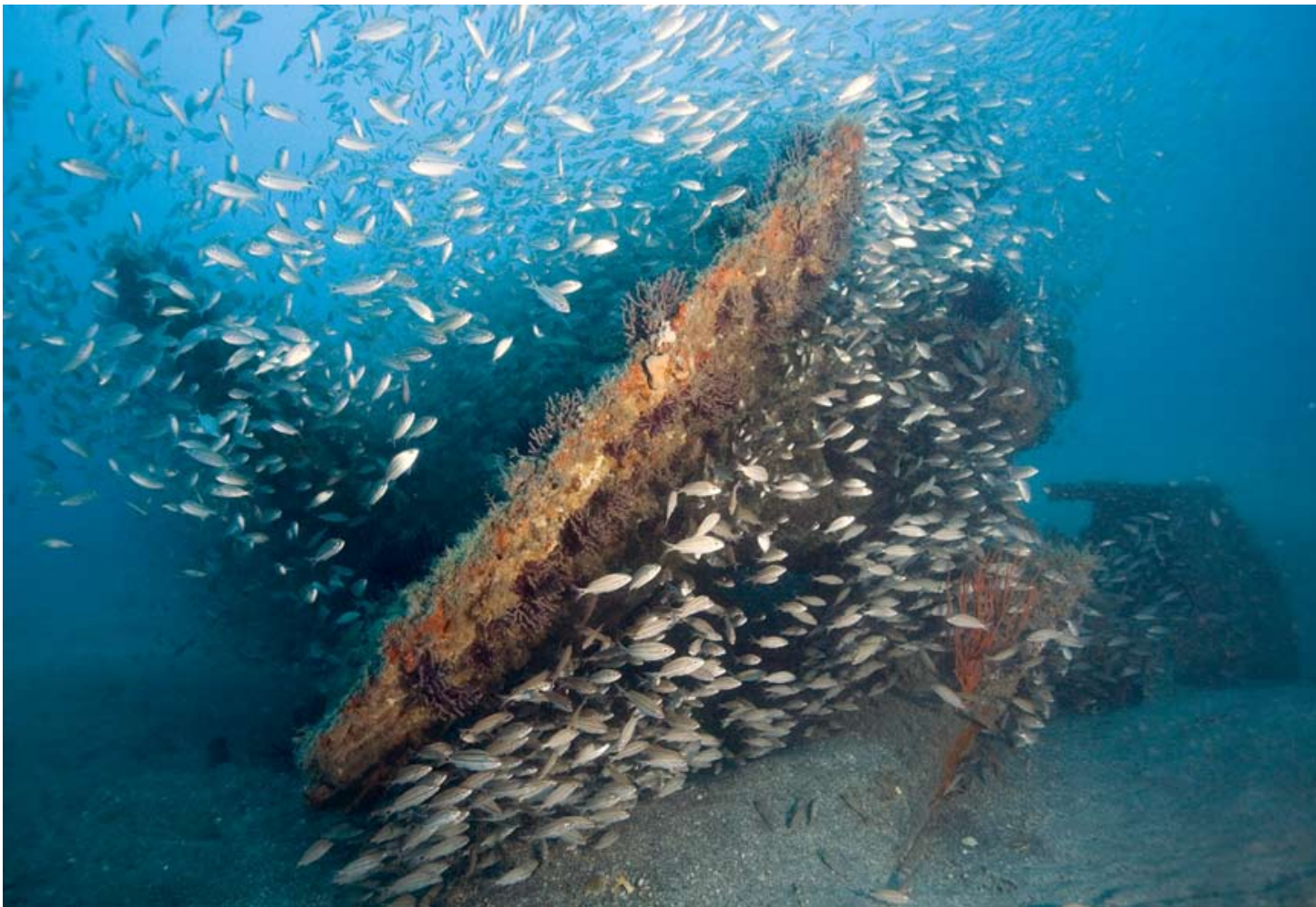


▲ *Mangled in battle, now covered in coral, the U-352's snorkel lies separate from the conning tower that once held it.*

Between their arrival in US territorial waters, December 27, 1941 and February 6th, 1942, the drumbeaters sank 25 ships. By the close of that same year, U-boat operations along the U.S. continental shelf had swelled into a seemingly unstoppable rampaging force from Maine all the way down into the Gulf of Mexico. My father, as a boy growing up near the Outer Banks, would watch the fires of their victims burn,

then fade into the black veil of night. In the span of one year, their number of kills reached close to 100, while sustaining only 21 losses of their own.

In response to this unseen threat, allied forces organized convoys with naval escorts. Homeland defense forces deployed long-range aircraft patrols and cruisers armed with depth charges, while at the same time working diligently on



more sophisticated sub hunting measures - from improving active sonar systems to radio triangulation and cracking coded intercepted messages.

Breaking the enigma code eventually made service aboard a U-boat near suicidal. By the end of 1942, the number of U-boats destroyed stood at 64. During the first months of the following year, 94 boats were sunk, culminating to the fleets' darkest point in time, Black May, when 41 subs were killed and another 37 damaged in

▲ *Listing 45 degrees to starboard, the stern of the U-352 creates a protective ledge for fish to hide.*

one month alone. One of the victims of this onslaught was the *U-352*.

The *U-352* was a VIIC design, measuring 218 feet, which included a 88mm deck gun mounted forward of conning tower.

Surprisingly, the *U-352* had not one kill to her credit. Worse yet, the second, soon to be last ship on which she fired May 9th, 1942, was the US Coast Guard Cutter *Icarus*.

Even among the most experienced, the biggest challenge to diving the *U-352*, as well as most of North Carolina's wrecks lying deeper than 70 feet, is waiting for the boat to hook in and set the down lines.

The procedure in this neck of the woods: a crew member has to go down manually to tie into the wreck. In *U-352*'s case, it's 120 feet to the bottom before anyone else can enter the water.

Depending on conditions, the drill can take 15 to 20 minutes. To expedite this more effectively, **Olympus Dive Center** divers are equipped with underwater communication gear. From the bottom the diver can advise the captain if he needs to move the boat, pay out more line, or give a detailed report of conditions from top to bottom.

**DIVING CONDITIONS:** The controlling variable to diving North Carolina's Outer Banks is the weather. One day it can be great, with calm seas and blue water, while the next day can turn foul, with either strong winds and rough seas, or just plain grim visibility in the 10 to 30-foot range.

The most influential forces of nature is the Gulf Stream as it swings its way northward along the coast. A result of its presence, summer water temperatures average in the high 70's, sometimes rising into the low 80's. Underwater visibility reaches upwards of 100 feet, which often includes enough current to make the use of a down line imperative.

Dodging the salvo, the *Icarus* made her own attack run, firing five depth charges, which severely damaged the U-boat internally, wrecked the conning tower and blew off its deck gun. Two more depth charge attacks forced the *U-352* to the surface where its commander, K.L. Rathke, ordered his crew to scuttle and abandon the ship. In the end, 17 of her crew were killed, with the rest taken in to Charleston as prisoners of war.

Today, the *U-352* is one of North Carolina's signature wreck sites. For divers making the journey to Morehead City down on the Crystal Coast, it stands near the top of the list.

Even with the briefing fresh in your mind, seeing the *U-352* materialize off the bottom, sitting with a 45-degree list to starboard is an amazing sight. Sitting 35 miles offshore, the *U-352*, along with other popular wrecks like the *Papoose*, lie in close proximity of the Gulf Stream, which often rewards divers with visibility in the 100 foot-plus range.

My first impression, following the descent line to the wreck is its size. Living quarters on most medium sized attack class warships from this era was far from luxurious. Life on a U-boat, with



a maximum width of just 20 feet, struck me as incomprehensibly claustrophobic, even if no one was dropping an explosive on you.

While still largely intact, most of what you see on the bottom is the remains of the pressure hull as the majority the U-boat's outer casing has rusted away.

Working the wreck for a few choice images, the non-photographer in me wandered down a different path. Through the years I have had the opportunity to dive a number of cool wrecks, most victims of storms or collisions with reefs, and even a few, yes, sunk by German U-boats. However, the experience of actually resting my hand on one of these predators for the first time left its own unique set of images. ❖

For more information on Germany's infamous U-boat fleet, log on to:

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# *In-depth Review:* **Subal CD5 Housing**

*by Walt Stearns*



**L**ike many underwater photographers looking to get high-end digital and SLR performance results in a relatively compact package, I've gone with Canon's 5D camera system. The difference between it and its most direct competitor, the Nikon D200, is that the 5D utilizes a full frame format, 12.8 mega-pixel, CMOS sensor instead of a 1.5 crop, APS-C, 10 mega-pixel CCD sensor.

Some have voiced the opinion that Canon's DSLR's user ergonomics are not as good as Nikon. For the better part of 20 years, I have shot Nikon, Canon, even Mamiya, and as far as I'm concerned, no

one camera system is perfect; it's what you make it. In the realm of underwater photography, such arguments are pretty much mute.

Far more important, is how any given camera, buttons and wheels in all, will function in a given housing. Also of considerable relevance is how that housing's overall weight, balance (how it feels in your hands) location of camera/housing's controls convey itself in a functional, ergonomic package.

**For a comprehensive review of Canon's 5D DSLR features and capabilities, log on to: [www.dpreview.com/reviews/canoneos5d/](http://www.dpreview.com/reviews/canoneos5d/)**

## **First Impression: Size Does Matter**

For Canon's 5D, Subal's new CD5 housing may be the answer.

Among my initial reasons for choosing Subal's new housing for the 5D is its compact size and weight. Less the handles and ports, housing dimensions run approx. 8-inches W x 6-3/4-inches H x 5-inches D (240x175x140 mm), weighing approx. 12.2-lbs. (2.2 kg).

When assembled, the **Subal CD5** housing with the GS finder, FE2 domeport, 60mm extension ring, 5D body and Canon 17-40mm zoom lens inside weighed in at 12.2-lbs., (5.5 kg). Making a transition from a similar Seacam rig for my 1D camera body was a welcome relief to my wrists. In defense, Seacam builds truly excellent housings, with controls that are silky smooth and well placed, and an exterior finish that is incredibly tough - I can vouch for this after dragging one housing through the jagged limestone passages of several of North Florida's caves.

The down side to Seacam's housings for Canon's 1D series, as well as Nikon's D1 and D2X DSLR's is that they are no lightweights. With the Superdome, PVL35 extension ring and S-180 finder, the housing weighed better than 16 pounds out of the water. Although only slightly negative submerged, it still had considerable mass, and was a beast to push through the water. With weight restrictions as they are in air travel these days (and are not likely to get any better soon) taking it and my 1D bodies on the road was even less fun.







Once the camera is inside, the housing's sync cord connection is via a single hot shoe that slides into the camera's own hot shoe atop the body. After setting up and breaking down the system between use, I've found that backing the body out takes more finesse than putting it in, due to the cable length on the hot shoe connector. Before backing it out, the hot shoe must be disengaged, which could pose a problem for anyone with thick fingers who is trying to slide it off. Although a little unwieldy, the cable length is set to prevent bunching up with the camera inside.

One design feature I find interesting is Subal's choice not to use the typical spring-loaded clasps to secure the housing's two hafts together. In their place is something Subal calls QuickLocks, which incorporate two spring-loaded tension levers to lock the housing shut. To open or close (it's important the housing be facing down



on something solid like a table when you do this), simply press down on the two QuickLocks with your thumbs while at the same time turning the levers outward to open, inward to lock. While I don't miss having my fingers occasionally pinched as was the case with many previous housings that utilized spring-loaded clasps, the jury is still in with regards to Subal's QuickLocks. They have worked fine so far, but I'm still waiting to see if they are something I can fully trust.

### What's At Your Fingertips

Like all sophisticated DSLRs, the 5D has lots of buttons for accessing the multitude of functions in the camera. Access to all of these controls is provided through ten sturdy, spring-loaded buttons, four control nobs and two levers.

For example, to change ISO, you press and release one of the top buttons, then scroll the rear command dial for a solution of your choice, tap the shutter lightly and



▲ *The CD5's top window provides a clean view of the 5D's settings and modes.*

you're done. The same goes for reviewing images, changing menu settings, and so forth. The only two functions missing is the direct print command button (who really uses that anyway?) and the toggle button for moving around a zoomed-in image on the LCD screen. That I would have liked.

Besides giving all the buttons and knobs a nice sturdy feel, Subal has for the first time been able to move the knob activating the rear camera dial more off to the right side where my thumb can turn it without having to change my hand position. In the past (all the way up to their current 1DS housing) this control was placed directly on top of the camera dial, one feature that has remained a pet peeve for most Canon/Subal users.

The "\*" button is controlled by a lever on the right side of the back plate. While small, it should not pose a problem for those wearing gloves or having big fingers.

A couple of photographers, me included, have found that the "\*" button-lever inside the housing will sometimes depress and hold the camera "\*" button when the housing was submerged below 25 feet, preventing the user from activating the camera's review or menu screen. In my case, the problem was quickly remedied by bending the "\*" lever back some 1 to 2mm.

Working off lessons learned between their housings for Canon's 10D and 20D, the CD5 housing features a small window with magnification properties. It's located above the 5D's mode dial so that you can see precisely what mode you're in.

Another carry over from their Canon 20D housing, is an ingenious mechanism in the front the housing next the port buoyant mount that allows the user to switch out



lenses without removing the camera inside. In the old days, changes meant using a pencil on the lens release button. Now, you simply turn the small knob clockwise until it stops, then push while at the same time turning the lens barrel counterclockwise. I will rate this one as a good compromise that in some way compensates for Subal's decision to fabricate housings with such small diameter port mounts. When making a quick swap from my Canon 17-40mm zoom to my 15mm fisheye or 100mm macro, it certainly beats the previous alternative.

One other nice touch I noted was the ability to pull back the CD5's on/off switch to center it on the 5D. I no longer have to remember to position both in the off position when closing up the housing.

### **Splashing the Camera**

Things looked good in on the bench, but the only way to really test a camera housing's worth is by taking it the sea. Based on my own 23-years of swimming with a wide variety of housings built by **Ikelite**, Tussy, **Aquatica**, **Nexus**, **Sea & Sea**, and most recently **Seacam** and **Subal**, I will say this about the latter two Austrian makes: These manufacturers have

◀ *This inside view of Subal's CD5 housing shows (just below the clutch for the focus/zoom gear) ingenious lever mechanism that allows the operator a simple means to depress the lens release button without removing or using the end of a pencil.*

*Just turn the small knob (on the front of the housing) clockwise until it stops, then push, while at the same time turning the lens barrel counterclockwise. It's that simple!*

a lot to learn when it comes to designing handles for their housings. Although the CD5's handles are made out of roughened resin composite, they lack the comfortable ergonomics found on models from Aquatica, Nexus and Sea & Sea – all of which provide something for gripping.

In the water, (I have medium sized hands) I was able to control the rear dial or lever for the "\*" button while at the same time trip the shutter release with

my forefinger. But because of the handles' shape, I found that the grip provided little in the way of a solid purchase. In situations where surge and currents are present, this can be a serious annoyance, especially when you need to do things one-handed. For this reason, a few colleagues of mine have retrofit their Subal and Seacam housings with Ultralight Control Systems TR-SC housing brackets with adjustable handles. ULC's can prove a better option.

## Providing the Big Picture: GS finder and LCD Window

There have been some complaints that the 5D viewfinder display provides limited visibility. With the exception of Canon's mk II series 1D's, and perhaps Nikon's D2X, viewfinder illumination in virtually all DSLR's is mediocre, largely due to the small size of the finder itself. Having both a 1D mk II and 5D, I would say they are almost equal. As good as the best ones are, in

housings they are nowhere close to the large action finders Nikon used to make for their F (2,3,4 & 5) series pro-bodies.

Seacam's answer for their digital DSLR customers is their S-180 finder, a truly marvelous set of optics that substantially enlarges the viewfinder's image, allowing for easier composition of subjects while permitting the operation to see principal information (shutter speed, aperture and meter readings) at the same time. On the downside, it carries the hefty price tag of \$1,800 U.S.

Subal's own version, the GS 180 optical finder (an \$1,080 U.S. option available for Canon



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▲  
*Subal's GS 180 optical finder provides the photographer a large, bright view of both viewfinder and image area without interfering with 5D's large 2.5" rear, 230,000 pixel LCD panel.*

1D, 5D, 20D, and Nikon D1X and D200 housings), is a very close and more cost effective second, and does a much better job than the standard optics used in most DSLR housings today. Furthermore, the tightly constructed GS finder does not interfere with 5D's large LCD screen in any way, which is a significant benefit.



▲ Good thing too, reviewing what you have shot on the 5D's 2.5" LCD is sweet.

Canon's latest round of DSLR's (1DmkIIN, 5D & 30D) now have larger 2.5" rear panel LCD screens with a resolution factor of 230,000 pixels. This makes it easy to read the camera's menu screen or to review an image, even when you don't hold the camera straight on. My only complaint with the GS finder is that when you are sighting up a subject, you need to look straight on, otherwise you will experience a dark shadow to one side or the other of

image area. It's a small annoyance, but I'd happily prefer it to an unmagnified, cropped sensor setup.

### Performance

Image quality from Canon's 5D is truly excellent, as it should be with close to 13 (12.8) mega pixels at your disposal. The most noticeable improvement over my 1DmkII is that the 5D does a far better job at handling sunbursts, as well as creating images that, to the eye, display sharper detail (probably due to a weaker anti-aliasing filter).

In auto focus mode, the 5D's speed and accuracy is no slouch. However, I would have preferred the 5D's nine AF points to have been a little more spaced out instead of the tight diamond pattern Canon's engineers have

Racked in to 40mm with Canon's 17-40L, this lionfish (photographed off North Carolina) rendered a sharp image at f5.6.



chosen. My only other negatives with the 5D include the lack of gaskets or seals for moisture protection (more of a confidence issue than a necessity) and its small battery – which provides just enough to fill one 4-gig card before needing a change over. Shouldn't complain here, because 244 frames in RAW sure beats the hell out of the old film days of 36 frames.

For wide-angle work, I have chosen **Canon's 17-40L, 15mm fisheye** and **24mm 1.4L** (for when really fast glass is called for) for the same reason as shooters such as **Stephen Frink, Brandon Cole,** and **James Wiseman**. At present, Subal only provides two ports for wide-angle optics, the DP-FE2 and DP-SW.

With the 5D, my recommendation here is go with the larger 7-inch diameter FE2.

Although the FE2 runs a few hundred dollars more than the SW port, you get a high grade glass port that will work with all wide angles zooms and primes, including full frame fisheyes where as the smaller SW will not.

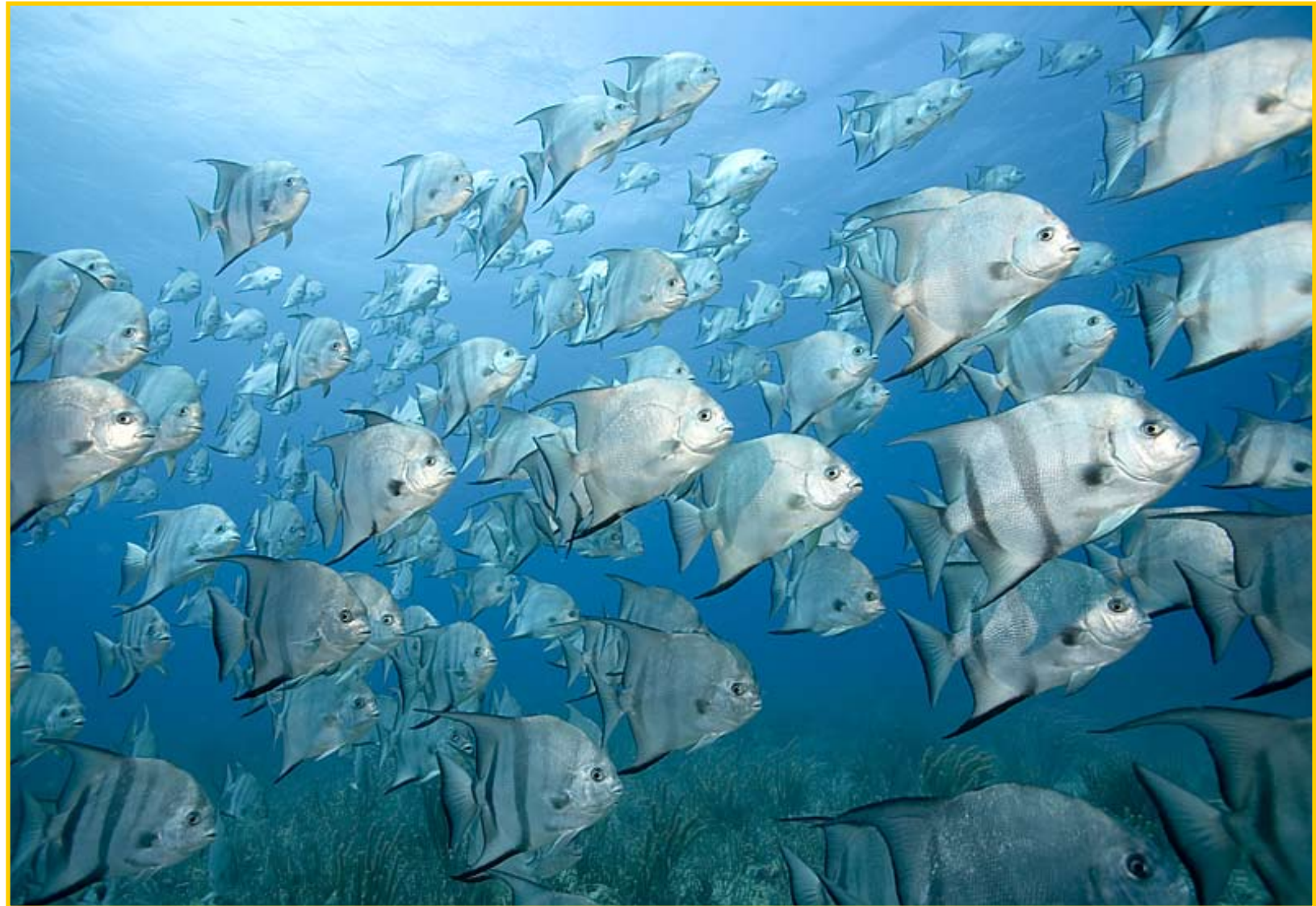
When using the DP-FE2 for the 17-40, Subal's Port selection page recommends using both a 50 mm extension ring and +2 diopter lens. I am not big on using diopter's for wide-angle work, for this one simple reason: with each graduation in magnification the lens loses a few degrees of coverage. For example, a +4 in front of a 17mm will reduce that lenses field of view that of a 21mm.

Stephen Frink found the same to be true after conducting his own round of tests last June with his 1Ds mkII/Seacam system. Frink configured his Seacam Supperdome with a 30mm extension ring and no diopter. A more acceptable alternative in my case was to step up to a longer 60mm ring.

Both he and I came to find that performance with the 17-40 in the 17 to 20mm range was good at apertures about f8, while below f8, the corners were noticeably soft ,and went to total mush at f4. As for the 24L and 15mm fisheye? On land, the 24L is Canon's best wide angle lens in their 28 to 15mm arsenal, underwater it is only marginally better (sharper in

the center) than the 17-40 at 24mm. By contrast, the 15mm full frame fisheye is a good performer all the way into the corners, but it comes across a little too wide for most wide angle shooting situations. I have found

an interesting solution that greatly enhances the versatility and performance of this lens, which I will share in the next issue of the Underwater Journal.



▲ Performance of 17-40L in the 17 to 20mm range can be very good to excellent above f8. Yet, while acceptable in most cases, corners will start to become noticeably soft, as demonstrated here in this shot of a school of spadefish taken at 17mm @ f7.1, going wider open than f5.6; count on corners to look soft to down right mush.



▲ Canon's 5D has proven itself at handling dynamic range with bright, shiny subjects where color balance and detail (like this large snook with a school of white grunts), are really critical.

## Final Thought

Like camera bodies, I have yet to run into the perfect housing. The housing's stock handles are somewhat disappointing, and I feel Subal could have done better. I would also like to see a locking system for the lens ports. The bayonet design works well enough, but they do have a tendency to rotate, brewing some concerns that a port could spin off the housing damaging the port, fall clean off, or worse yet, result in a major flood. Although extremely rare, it has happened. Just be aware and treat it with reasonable care.

All in all, Subal's CD5 housing permits Canon's 12.8 mega pixel 5D to really show its stuff while still managing to look good in the process. Even after more than half a dozen dives inside North Florida's cave system (Devil's Ear, Peacock and Telford Springs), as well as another 20 off Florida's east coast and North Carolina's wreck country, the housing's outer hard coat enamel finish is still as bright and blemish free as it was out of the box. I don't think there is a place I would hesitate to take it. It's no fun if you can't get wet. ❖

***To find out what others are saying about Canon's 5D, as well as housings for this or other Canon DSLR's, go to [Wetpixel.com](http://Wetpixel.com) forums and reviews.***

*Gear Locker:*

# **ZEAGLE** **Rapid Diver**

*By Nicholas Lypps*

**I**magine a complete SCUBA rig that weighs less than 20 pounds, will fit into the overhead bin of an airliner, and can be donned and dove in less than a minute. This product actually exists, and it's known as the Rapid Diver.

But don't liquidate your current scuba gear on ebay quite yet. The Rapid Diver is one of the most interesting new pieces of equipment to hit the dive market in recent years, but it's not likely – or intended – to replace conventional BCs, regulators and tanks.

Raid Diver is the brainchild of Chris Defelice, a long-time diver with a background in the entertainment and theme park industries. Defelice felt there was a need for a smaller, more user-friendly scuba rig that could be used to enhance the user experience during introductory scuba classes.

"I saw a lot of first timers struggling with heavy gear during intro to scuba experiences," Defelice explains, "I figured there had to be something that was easier to use and more comfortable, and you don't need a full-sized 80 when you are in the pool or on a shallow beach dive."

What he developed was a rig that

veteran divers will find reminiscent of their original "horse collar" BCs. Unlike these earlier designs, however, the product that would be dubbed the Rapid Diver sported a load-bearing harness that wrapped around the back to secured the air cell to the diver's chest and take the weight off the neck. Another major change – this one reminiscent of the original Fenzi vests – was the front mounting of the air tank.

Defelice enlisted the help of former Sport Diver Editor-in-Chief Pierce Hoover, and after two years of R&D with a variety of prototypes, they brought the product to **Zeagle Systems**, where additional refinements resulted in the product that made its debut at the 2005 DEMA Show. Initial reactions were mixed from the sport diving community, but there were other groups that embraced this compact design with great enthusiasm.

The law enforcement and public safety diving sectors immediately recognized the value of a rapid-deployment rig that would allow a responder to enter the water in less than a minute. Equally enthusiastic were the helicopter and boat-based rescue divers who are sometimes required to stand by in full gear for long periods of time. A subsequent showing at a Special Forces warfare conference yielded a number of potential military applications.

I first had the opportunity to trial a Rapid Diver at Weeki Wachee Springs in the spring of 2006. The production unit I dove was fitted with a 20 cu. ft. aluminum tank – other options include a 13 cu. ft. aluminum



▲ *In places like Weeki Wachee Springs, FL, people of all age groups are now starting to learn that scuba diving does not mean having to use a lot of heavy equipment.*



▲ *Rapid Diver creator, Chris Defelice, wearing a Rapid Diver fitted with a 30 cu. ft. steel tank.*

for small divers, and 30 cu. ft. steel tank for extended duration. My first attempts at self-donning were a bit awkward, but the process became much easier once DeFelix showed me a few simple tricks for pre-adjusting the harness, then cinching the waist straps once the unit was in place. After a few tries, I was indeed able to don and adjust the system in well under a minute.

My first favorable impression was established while on the surface. When the load bearing harness is properly adjusted, the wearer experiences almost no gear weight, and can walk, move and even sit with ease. The model I wore was fitted with a new Zeagle regulator – the Razor – which is a first stage that threads directly into the tank valve, incorporating a small on/off valve and a unique quick-fill adapter that allows the tank to be refilled from a larger scuba cylinder via a transfer hose, or at a standard air fill station.

Once in the water, I was delighted by the sense of freedom provided by the compact configuration, and the absence of a large tank on my back. Watching others use the rapid diver reminded me of the original rebreathers used by Hans and Lottie Hass, save for the familiar stream of exhaust bubbles. In the shallower depths of the spring basin – typically 25 feet or less, I was able to perform a leisurely 25 minute dive – ample bottom time for the average intro to diving course.

Public safety diving professionals who have assessed the unit's potential estimate it could provide up to 10 to 15 minutes of



▲ A boater uses his Rapid Diver to de-foul a prop.

▲ Zeagle Razor first stage regulator.

bottom time in more stressful rescue or reconnaissance scenarios, which is how they feel the unit will earn its keep. The thinking goes that when a car goes in a ditch, a first responder could don the Rapid Diver and be in the water effecting a rescue in a matter of minutes.

As far as the recreational community goes, the most obvious use of the Rapid Diver is in the real of introductory scuba experiences, where the unit's universal fit capability should simplify the operator's job, while the light weight and comfort factor could improve the customer's experience. Beyond that, there have been stories of divers using the system in shore diving scenarios where depths are relatively shallow and access is difficult. One user

told of wearing the unit to transit the rocky terrain of Massachusetts' breakwaters. Boaters have also adopted the device, as it can store easily in a hatch or engine room, then easily deployed to free a fouled prop or check an anchor line.

Overall, the Rapid Diver provides an interesting new twist on the diving experience. It will most likely enjoy its greatest success in the training, public safety and military diving communities, but recreational divers looking for a new way to enjoy the underwater world might also want to give it a look. ❖



*Book Review:*  
**THE MANUAL OF  
FREEDIVING**  
**Underwater on a Single Breath**

*Reviewed by John Christopher Fine*

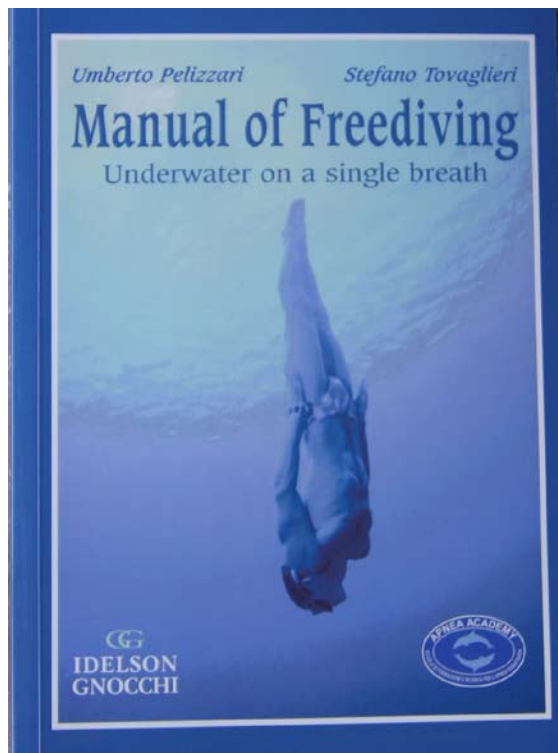
In Europe freediving is an art form. For many divers in the know, freediving is the building block upon which good diving and underwater skills are based. For spearfishermen, scuba is against the law, therefore they must rely on their skills of diving on a single breath.

A huge difference to the U.S., where quickie scuba courses seek to get uninitiated postulates into the system as soon as possible. Unfortunately what is left out is the refinement of water skills above what some would decree as adequate.

In this new book, "**Manual of Freediving, Underwater on a single breath**", two champions, Umberto Pelizzari and Stefano Tovaglieri share their knowledge of breathhold diving.

A graduate of the University of Milan with a degree in informatics, Pelizzari is a household name in Italy, not for work in his degree field, but for his 17-world breath hold records. His legendary deep dives include 80 meters in constant weight, 131 meters in variable weight and 150 meters in no limits category of diving on one breathe down and back.

Coauthor Stefano Tovaglieri's own experience has lead him to not only be an active member of Italian apnea teams, which have taken several world championships, but also with Pelizzari, to be apart of the Apnea Academy ([www.apnea-academy.com](http://www.apnea-academy.com)), a school for instruction and research into sub aquatic breath holding.



The authors are not only champions in their own rights but instructors and coaches (Tovaglieri holds a university degree in physical education), whose teaching skills draw upon their years of experience in breath hold diving.

The book is illustrated by talented artist Nicola Refolo

with detailed illustrations that complement the text. Detailed illustraitons are provided for all exercises.

Freedivers who pit themselves against the elements with one breath of air need to be cognizant of their own limitatons, and of the risks and stressors involved.

The authors of the *Manual of Freediving* discuss these issue in great detail. providing helpful insights instructors can

utilized when working with students both before and during a dive.

Finning is explained in detail. The economic use of the fin stroke, a requirement for effective free diving, is so often overlooked by scuba divers that the bicycle kick is a norm even among some scuba instructors. The *Manual of Freediving* provides extraordinary insight into the methodology of finning, as well as the proper alignment of the body.

The text also includes informaton on the specialized techniques of clearing the ears with a single breath. These exercises and techniques are not only explained, they are clearly shown by illustrations.

The *Manual of Freediving* is well written, translated from the original Italian professionally and informative, making it a must for every serious diver's library.

*Manual of Freediving*, 366 pages, illustrated throughout in black and white, is available from the publisher Idelson Gnocchi Publishers Ltd. for \$39.50. Contact them at 12385 NW Hwy 225-A, Reddick, FL 32686 telephone 352 591 1136 FAX 352 591 1189 or visit their web site at [www.boatseafari.com](http://www.boatseafari.com). ❖

*ABOUT THE REVIEWER: John Christopher Fine is a Master Scuba Instructor and Instructor Trainer. He has authored 23 books, many based on his experience and training as a marine biologist. He has served as a member or officer of many international bodies whose goals are ocean conservation.*

## E-pinion:

# Is The Tide Turning For Sea Turtle Protection In California?

By Karen Steele



Photo by Scott Eckert

**E**ndangered sea turtles. These graceful creatures have long fascinated people and for years the United States has played a lead role globally in their protection.

But the tide could be turning. The government is now seemingly more interested in rolling back conservation measures than protecting the last of the sea turtles, particularly along the California coast.

At a time when all seven species of sea turtles are considered endangered, and the Pacific leatherback sea turtle - over 100 million years old - is on the verge of extinction, decisive action is needed to protect these species. And this has been the role that the United States once played.

They led the way in the early 1990's by developing and implementing Turtle Excluder Devices for shrimp trawlers that provide sea turtles an escape hatch from shrimp nets. This saved their lives by the thousands and 20 other countries soon followed suit.

In 1999, a role-model conservation effort was implemented when the Hawaii swordfish longline fishery was closed to protect endangered sea turtles.

In 2001 these efforts turned to focus on

protecting Leatherbacks that visit California waters. A Leatherback Conservation Area was declared to protect a critical habitat area for leatherback sea turtles that are found along the California-Oregon coast.

This protection banned drift gillnet fishing, which has a high rate of sea turtle capture, from Monterey Bay to the mid-Oregon coast between August to November each year while leatherbacks are visiting to feed almost entirely on jellyfish.

As these turtles are critically endangered and have traveled across the entire Pacific ocean (over 6000 miles) from Indonesia to the California coast, it seems they have earned the right to be provided this basic protection.

Finally, in 2004, the US West Coast within 200 miles from shore was closed to longline fishing in a further effort to protect endangered sea turtles.

Recently, however, the tide seems to be changing - at the least the West Coast tide - for sea turtles in California, and not for the best.

Attempts are being made to rollback the Leatherback Conservation Area. This is despite the area being closed precisely because it was found the survival of the

Pacific leatherback sea turtle would be placed in jeopardy otherwise.

Nothing has changed - the same boats using the same nets will be fishing in the same area and the leatherbacks are now in even further decline. This decision is to be announced mid-September.

In 2004 the Hawaii swordfish longline fishery was reopened, with the claim new hook technologies would solve the problem of sea turtle capture. This was short-lived with the fishery being shut down prematurely due to its high capture of endangered sea turtles.

Though it seems little was learned from this experience. There are now plans in progress to spend federal dollars to test the exact same hooks on the California coast.

This would be overriding a historical state law that has banned longline fishing in California waters for over a decade.

The question we should be asking at this time, when the Pacific leatherback sea turtle is at historically low levels - as little as 2,300 nesting females left from over 90,000 just two decades ago - is whether the United States wants to be celebrated for its efforts to help bring this species back from the brink, or be seen as contributing to its decline.

Lets keep the tide turning good by keeping these role model protections in place! ❖

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## *Lessons From the Deep:* **When the Hunt Goes Very Wrong**

by Allen Young

### **"Fish Kills Spear Fisherman!"**

is not a headline you would call routine. But, one Saturday afternoon last September, it happened. The first line of the news story just about said it all: "A Florida diver shot a large grouper with a spear gun then apparently drowned when the fish sped into a hole, entangling the man in the line attached to the spear."

Even before the name of the deceased was released on traditional news outlets, word of the accident had spread throughout the net, fueling speculation and debate on forums such as **spearboard.com**, and **scubaboard.com**.

The diver was a 42-year old former Georgia native named Gary Cagle, who had moved to the Florida Keys and developed a passion for spearfishing. To those who knew him, Cagle was an avid freediver who trained regularly to keep his 175-pound frame in top shape.

Cagle reportedly left Stock Island on his PWC alone about noon. From there, according to the investigators' best guesses, the scenario went something like this: Cagle was working a shallow reef in 25 feet



of water, a half-mile off Smathers Beach. At some point he had, either by choice or mistake, shot a 40-inch goliath grouper. Wounded, the fish bolted under a coral head, wedging itself tightly. Not being on scuba, Gary had to depend on his breath hold capabilities to work the fish out or free the shaft. He obviously came up short.

When he didn't return that night, his friends became worried and called the Coast Guard. One of Cagle's close friends, Lori Kerry told reporters that "while we worried about Gary diving by himself, we also didn't worry because he was so good at it."

Cagle's PWC was found that night but his body wasn't located until the following morning when Key West Police divers it was pinned to the coral 17 feet down. Cagle's mask was still on but the snorkel was out

of his mouth. The spear line was wrapped three times around his wrist with the spear shaft still in the carcass of the dead fish - shot right through the gills.

Kerry said Cagle was not a careless diver. But she has no answer why his knife was left behind on her porch. "It's normally on his leg," she said.

Critics feel Cagle obviously made two serious mistakes. The first was being out in the water alone. The second was forgetting his knife. In an interview with the Miami Herald, Bob Holston, director of operations at Dive Key West, said that freediving and spearfishing accidents are rare, and when they do occur it's usually

because safety practices weren't followed. "Not wearing a knife is like crossing I-95 with your eyes closed," Holston said.

That error cost Cagle his life. Marks on his body showed he struggled to free himself from the spear line, but failed to break free and drowned. While this type of accident could easily go down as dumb luck, there are additional details that fueled the controversy. Namely, why did he shoot a highly protected species?

Since 1990, the taking of goliath groupers in the Keys, or anywhere else in U.S. waters is a felony. Among knowledgeable divers in the spear fishing community, Cagle's death is an enigma. Why did he shoot a protected species? In clear water, a goliath is unmistakable from other species of groupers.

On several of the dive forums, some of the sentiments got rather harsh: "Poetic justice for poaching;" "If he shot a Jewfish, it serves the poaching SOB right."

But friends of Cagle's, expressing doubts that he would have speared the protected specie intentionally, believe something unexpected happened. "Cagle had great respect for nature." Kerry told the press, describing how he once insisted she return a 50-pound goliath she had caught by accident.

Formally known as jewfish, goliaths can be formable in appearance. A full size adult can exceed 500 pounds. This largest species of tropical Atlantic grouper is often perceived as being slow-witted, shy, and even docile. They will sometimes allow inquisitive divers to get close enough to touch.

But among the spear fishing community on Florida's west coast, the perception of these hulking creatures is a bit different. Many Gulf Coast hunters claim the fish are a nuisance. Some insisting that the goliaths on several of the popular wreck sites between St. Pete and Clearwater have grown so aggressive at stealing speared fish that they become a menace, to even grabbing a spear fisherman's arm or leg.

"He must have been trying to protect his life," suggested friend Lori Kerry.

But other experienced divers see the self-defense theory as an unlikely reason for spearing a goliath. There was no evidence Cagle was carrying a stringer full of fish. In addition, the goliath Cagle shot was 41-inches and would weighed 50-pounds at best. Last, the fish was "shot right through

the gills," not down the throat or between the eyes, as one would expect from a head on charge.

Florida Keys resident and goliath advocate Don DeMaria says: "I've been around a lot of goliath grouper going back to my earlier days of commercial spearfishing (and more recently assisting National Marine Fisheries Service and **FSU** in their research) and continuing protection of these majestic reef giants. In that time I have never been attacked, nor have I ever had a goliath take an aggressive posture or make a false charge. If anything, whenever I invade one of the big fish's space, it retreats."

When it comes to bad behavior, Don sees the threat level of a typical goliath as all bark, no bite. "Sure, you stand a good chance of getting hit by one should you accidentally block its only escape route in a wreck or cave. But the most I get from them is a lot of noise, typically the booms they make when upset," DeMaria says.

The only certainty that can be drawn from this unfortunate accident is that if

Cagle had his knife - an essential for any hunter - he could have cut himself free of his own line or any other entanglement. And not just any knife. Cutting a line in the water can be a difficult task for a conventional blade, or even a serrated blade surface. Experienced hunters, like wreck divers, typically choose a blade with a dedicated line-cutting indentation, and may even carry a separate line-cutting tool similar to those used by cave divers.

To decrease the chance of being pulled under or trapped, some freedivers advocate using a reel on the gun to make line handling safer, or floats and lines (common system used when targeting big fish) that allow a freediver to surface without losing his prey, as well as make it easy to locate both the freediver and the fish.

In addition, solo freediving can entail far more significant risks than solo scuba diving. Even the most experienced freedivers can only stay down a few minutes, and each time they extend their bottom time or expend additional energy during the dive, they risk the possibility of shallow water blackout from hypoxia during ascent.

Had Cagle taken any or all of these precautions, the outcome of this story just might have been different. ❖



◀ *Dedicated line cutters like this (pictured left) are indispensable tools among wreck and cave divers. The hook-shape design with the blade at the bottom of the indentation allows the diver to grab and cut the line with a simple pulling motion.*

**Next Issue:**

# **North Carolina's Crystal Coast**

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**AquaLung Mistral Doublehose**

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