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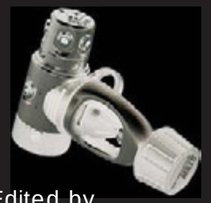


Edited by
Rosemary 'Roz' Lunn
& Arnold Weisz

POINT & CLICK ON BOLD LINKS

Equipment *totally cool*

Xeo

The Liquivision Xeo is a wrist-mounted air, nitrox, and OC/CCR trimix computer that can serve divers of all levels. The Xeo is compact and light weight, and its bright full-colour LED display is easy to read. It is operated with a tap-interface and is designed for ease of use with both bare hands and thick gloves. The computer is shaped to fit the wrist and the screen is angled to optimized readability. The battery is user-replaceable. **Liquivision.com**

Hollis Ride

Ride is a technical BC that has been made specifically with travel in mind weighing in at just 5lbs but packed with technical features. It includes a simple yet strong nylon one size harness, that fits most and is easily adjustable. The wing is a rugged one-piece 1000 denier cordura and with stainless steel two-inch D-rings on the shoulders and hips, padded crotch strap, back pad and lower storage pouch. The wing comes in two sizes with 23 and 37lbs of lift respectively and, depending on the size, can be used with single or twin tanks. **hollisgear.com**

Smartfind beacon

The Smartfind S10 AIS Beacon is a manually activated personal safety device that incorporates both AIS (Automatic Identification System) and GPS technology. When activated the Smartfind S10 transmits a unique alert signal to the vessel the individual has come from and to all AIS enabled equipment within a typical four-mile range, signalling that help is required in a man overboard or lost diver situation. Smartfind S10 is fully submersible to 60 meters, buoyant and compact, intended for carriage by divers, crew and anyone who works on or carries out leisure activities on the water. **mcmurdo.co.uk**

iQ

This sturdy iQ jacket with adjustable hood is water repellent and wind resistant, yet breathable. Other features include zippered arm pocket, zippered side pockets, water repellent hood, fleecy lining and embroidery on the shoulders and chest. **iq-company.com**

Tusa Voyager

The BCJ-1800 Voyager is TUSA's bid for a lightweight and compact BC for warm water divers or the constant traveller, weighing only 4.4lbs/2kg. The Voyager can be rolled for travel and features a unique console sleeve, on the left side, for streamlined routing of your gauge or computer console. It features the integrated weight loading system (W.L.S.), which permits easy weight loading and release and the Independent Harness System that was developed to significantly reduce weight and structure. **tusa.com**

Aeris light

The AT600 ION LT over-balanced diaphragm first stage is brand new and weighs less than a pound. The AT600 ION ION LT is non-environmental but comes with the option to add an environmental conversion kit.
diveaeris.com

rEvo CO_2 monitor

We were recently shown rEvo's carbon dioxide monitor that works in conjunction with Shearwater's Predator dive computer. The sensor itself doesn't look like much—a bit like a stick of metal, or an antennae, in the center of the radial scrubber canister where it measures the warmth given off by the active zone on the scrubber. Keep an eye out for the specs once it gets posted online. **revo-rebreathers.com** and **shearwaterresearch.com**

HDS Pro-elite

The HDS Pro-elite is a new lightweight and flexible, yet very durable trilaminate from the English drysuit specialist, Hammond. Produced from a special fabric called Rhombus Weave Terrazza with single-stiched and double-taped seams, this suit is built to last. It comes with valves from Apex, latex wrist seals, neoprene neck seal and zips with protective flaps.
hammond-drysuits.co.uk

Aqualung Axiom

This high-end, jacket-style BC incorporates Aqua Lung's i3 technology, a streamlined integrated inflation and deflation system that makes buoyancy control easier. The new patent-pending Wrapture™ Harness System completely supports the weight of the tank with an innovative wrap-around backpack, Aqua Lung writes. This keeps the cylinder closely secured to a diver's center of gravity—the back—and efficiently distributes its weight to provide superior stability. The Wrapture system works in conjunction with Aqua Lung's patented shoulder swivel buckles to prevent the BC from riding up while making the tank feel lighter. **aqualung.com**

Green Force HID50 LED

Should you be so unfortunate as to drop and damage your precious Green Force lamp, despair not. With this new HIF 50 LED upgrade, the user can now easily replace the lamp, as all the connections of the battery packs and the light heads are identical (Green Force TOS connection*), all the components are interchangeable and one has the choice between eight battery packs and 20 light heads, which vary from halogen over LED to HID and are all compatible and modular.
green-force.com

Jill Heinerth

Text by Bonnie Harris McKenna
Photos courtesy of Jill Heinerth

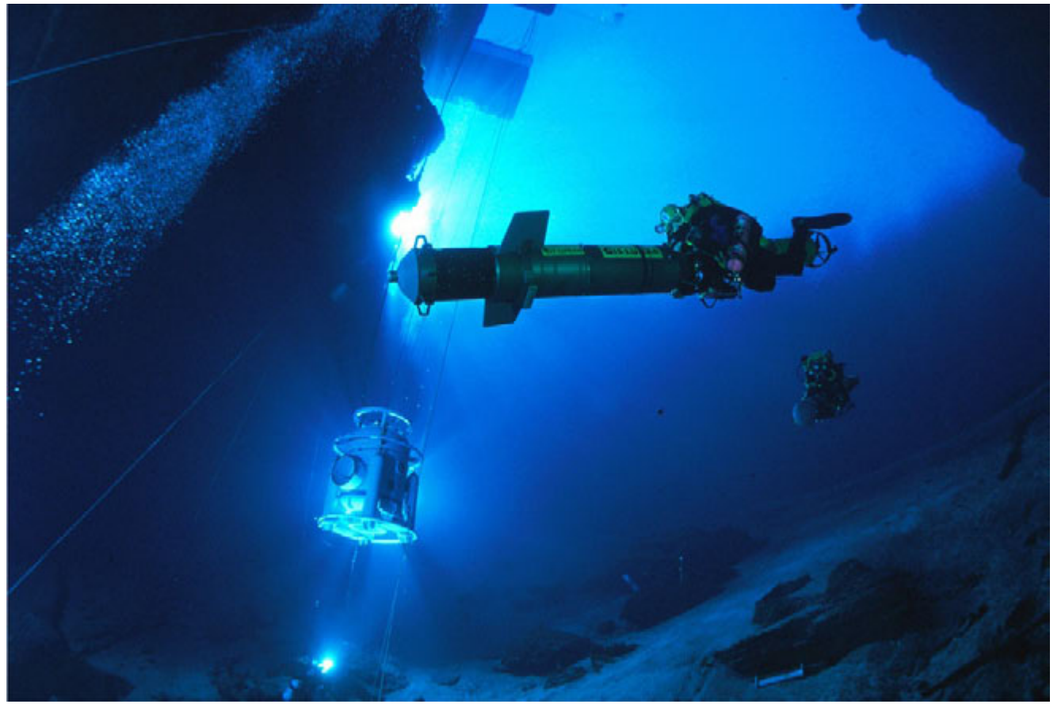
Jill Heinerth, whose first job was a newspaper route in her home town of Toronto, Canada, is today a pioneer technical diver and instructor, a renowned explorer of underwater caves who owns a record for the deepest and longest cave dive, and a record for the longest dive into an Antarctic iceberg. She is also a respected filmmaker, author and photographer. She has been honored by the diving community by being an inaugural inductee into the Women Divers Hall of Fame, and this year, she will receive the Nogi award in recognition of her continued work in the dive industry.

Heinerth currently resides in High Springs, Florida, with her husband, Robert McCellan, who is not only her life partner but her business partner, too. He has a background in concert promotion, as a studio engineer and a Navy SeaBee combat photojournalist—all critical tools at Heinerth Productions.

Heinerth earned a Bachelor of Fine Arts in Visual Communications Design from York University. "It is a highly specialized and competitive four-year degree that puts out creative professionals. My advanced education is in curiosity," she commented.

BHM: When and where did you become interested in SCUBA diving?

JH: I was a volunteer swim instructor and lifeguard at a local swimming pool when, at age 16, I got a chance to try scuba. I was hooked. I finally got certified in university. I had been wanting to do it all my life, but I had to earn the cash to take the



classes. My early years in diving were in Tobermory, Canada, in the wreck capital of the Great Lakes.

BHM: Did you have a hero when you were growing up that influenced your desire to dive and explore?

JH: This may sound obvious, but I loved Jacques Cousteau's Undersea Adventures. It was on on Sunday night, and we were permitted to have our dinner in the living room to watch the show. That was a real treat. I also thought the astronauts were pretty cool.

BHM: Diving, writing, filmmaking, photojournalism – which came first, how did you connect them and why?

JH: I had a small advertising and graphics company in Toronto and taught diving at night. The ad agency was the money. The diving was the relaxing bit. I knew I needed to find a way to bridge my two loves, so I sold the business, packed up and moved to the Cayman Islands for almost three years working as a dive instructor, guide and managing the marketing for the resort. In terms of photography, I think I have always been the person to document life and share it.

BHM: If you could switch professions, what would it be?

JH: That's tough, because I am living my dream.

BHM: What do you do when you are not working?

JH: My husband and I have a really weird yard. We grow as much of our food as possible and built an outdoor shower, a yurt and a geodesic greenhouse. We love working on our mini-farm and yard art. We are also avid cyclists and paddlers.

BHM: What is the one thing about you that your colleagues may not know?

JH: That one thing is actually two. I am a painter and love to watch "Dancing with the Stars". My husband loves watching, too. We watch very little TV; we don't even have cable or satellite; we have to rely on what we can get with our antenna.

BHM: What are the greatest challenges you have faced in your career?

JH: I've faced numerous challenges being a woman in a man's world. Whether it is in the field of technical diving or filmmaking, that said, the older I get, the more our world seems to embrace talent in either gender.

BHM: What are the most important attributes of a person who wants to get involved in the work you do?

JH: I think humility is the key… perhaps in all aspects of life. Tenacity is critical, too. If you have a dream, you can accomplish anything you set your sights on, but it will take tenacity and really hard work to succeed.

BHM: How do you prepare for the demands of tech-diving?

JH: In diving, fitness is ideally important and that includes physical and mental fitness. I manage to put in hundreds of dives every year, but I still focus on rehearsal and currency. I have a lot of diving toys and have to remain fresh and current before taking those toys out on a job. Then, Practice, Practice, Practice and always accept new learning opportunities.

BHM: What kind of person do you want diving on the same team as you?

JH: Open minded. Comfortable in their own skin. Versatile, creative thinkers and hard workers.

Heinerth

BHM: When preparing for an expedition what are you looking for in team members?

JH: On expeditions, I might be looking for a particular talent beyond diving, such as an audio recordist or mechanic. I cannot afford a huge crew, so I need fewer people to cover more bases.

BHM: You are known as an expert in the use of closed circuit rebreathers. Recently, PADI's magazine, Undersea Journal*, had an article discussing the launch of their Rebreather Diver and Advanced Rebreather Diver courses that address recreational divers diving with Type R rebreathers. The courses are scheduled for announcement in the third quarter of this year. What are your thoughts and do you think it might be the wave of the future in diving?*

JH: The industry is simplifying the Type R rebreathers so that they are automated and easier to use. I do not know if they are the wave of the future, but if the marketplace is up to it and willing to grow with it, it might be. There is nothing like diving with no bubbles, you can get really close to observe the animals.

BHM: What influences your selection of rebreathers?

JH: I have owned a lot of rebreathers, but that is because I am always willing to look for the next greatest innovation. It is life support, and you should own the best thing you can afford. I have to be able to look my husband in the eye (he barely dives) and tell him that I am using the safest thing available to me.

BHM: Much of the work you are known for involves cave diving. Were you exposed to exploring dry caves before you started cave diving?

JH: I was exposed to dry caves first. I always loved small spaces, but they feel even more comfortable to me when I am underwater.

BHM: What is your fascination with caves/overhead environments?

JH: Cave diving is like swimming in the veins of Mother Earth. It feels primordial. When I cave dive and follow the flow of water, I feel like I am seeing things that nobody has witnessed before…and many times, I am. I love the allure of exploration, and caves are perhaps the greatest source of the unknown.

BHM: I believe you own a record for your cave diving expertise.

JH: Yes, it was at Wakulla Springs for five hours at 300 feet.

BHM: What drives you to push the envelope?

JH: Life is a puzzle, and I believe that almost anything can be solved with the right tools, patience and imagination. Exploration often leads me to push the limits of human endeavor, but it is always secondary to finding the answers for questions that drew me in the first place.

BHM: How do you see the future?

JH: It is an interesting time of change in our world. There is a great shaking up of old ways and old institutions that don't serve the population. Everything about how I work has changed. I have to work leaner, broader and smarter in every aspect of my business. I embrace that change as exciting, and I feel very positive about the world that will arise from the change we are experiencing today.

BHM: Are there any caves you will not dive?

JH: Definitely not!!!

BHM: What are your best and worst experiences?

JH: Antarctica and Antarctica. It was like going to another planet, but there were many physical and mental challenges.

I was also one of the closest calls I ever had.

BHM: Can you tell me about it?

JH: First, let me clarify. My worst experience was getting bent. Antarctica was another experience altogether. It was my first ever cave dive in an iceberg, and my two partners did not have experience with icebergs either. We were on a National Geographic assignment in 2001 to intercept and dive B-15, the world's largest recorded iceberg. [B-15 calved from the Ross Ice Shelf in March 2000 was larger, in area, than the island of Jamaica and estimated to weigh around three billion tonnes. Despite breaking up several times, after a decade parts of B-15 still have not melted.]

On the last dive, we were pinned inside the iceberg cave by the current. We were at 130 feet racking up deco, literally crawling on the bottom as the current kept sucking us back into the iceberg. Later, in the evening, while back on board the ship, we heard a loud explosion; the iceberg exploded into a square mile of ice cubes. It also spawned an enormous wave. Diving the iceberg was an incredible and unique experience.

BHM: How did you get started in filmmaking?

JH: I did some TV work before I started filmmaking. In fact, the first story I wrote for film was the Antarctic film in 2001, and I have done a number of independent films since that time.

BHM: If the whole world were listening, what would you tell them?

JH: My biggest passion is working toward water literacy, teaching people gently how they are intertwined with their drinking water resources and how they can be good stewards and protect those precious resources for the future. That means I talk to a lot of students, Rotary Clubs, organizations, etc. People must know where their drinking water comes from and understand that their actions on the surface of the Earth affect the quality of the water beneath their feet. We will be fighting wars over water... not oil.

When I swim in underwater caves, I am acutely aware that I am swimming through the life blood of our planet. I get to swim through the very veins of Mother Earth. As I chase freshwater beneath the surface of the earth, I realize everything that we do on the surface of our porous planet will be returned to us to drink. I've seen the changes in the quality of water. I've noted the diminished flow that sometimes allows a cave system to choke and stop like a clogged artery in a heart attack.

There is a small infinite amount of clean fresh water on our planet, and I get to explore the limits of one of the largest windows on the underground on Earth.

I think Florida is a microcosm of what is happening elsewhere. We are pumping more water out of the ground everyday than is replenished by rain. We are the largest water hogs east of the Mississippi using a gluttonous amount [of water] to create ridiculous golf course lawns that we cover with pesticides, herbicides and fertilizers that soak into the ground, flow through the landscape and pollute springs, rivers and lakes. All that eventually pours out in the nurseries we find in estuaries, and it causes horrible filamentous algae to explode on our coral reefs.

Don't get me wrong, it is not just lawns; there are many other sources of nitrate pollution, but it serves as a good example of how we, perhaps unknowingly, cause catastrophic events downstream from normal everyday actions in our homes.

I don't [think] anyone really wants to pollute or [they] would connect their lawns with our oceans, but I think my biggest and most important job in life is to help people make these connections and make better choices in their lives whether at work or at home. With education and a lot of small changes, we can make a difference.

If we can increase water literacy and recognize clean water as a basic human right, the world will be a more peaceful place.

"When you do push the envelope and your experience fear, it is like there's a new boundary for what is possible."
—Jill Heinerth.

BHM: Are you currently working on any new films?

JH: Yes, two works are in progress: *Ben's Vortex*, which is about a diver who disappeared in vortex Springs and has never been found. The other production is *We Are Water*, which is about fresh water resources on our planet—our most precious resource. ■

RECORDS:
Women Divers Hall of Fame
- Longest dive into an iceberg—2001: Three hours using Cis Lunar MK-5P rebreather. Water temperature -1.9°C (28.6°F).
- Longest deep cave penetration—1999 (Women): 3,050 meters (10,000 feet) cave penetration at a depth of 91 meters (300 feet) for five hours during a science and mapping dive at Wakulla Springs.

BOOKS:
Essentials of cave diving (2010)
Cave diving: Articles and opinions (2008)
Digital underwater photography (2010)
Side mount profile (2010)

PUBLISHED IN:
National Geographic
Smithsonian
Deep (China)
Diver (China)
Wired
All recognized dive publications and countless newspapers and Web sites

FEATURED IN:
Sports Illustrated for Women
National Geographic
National Geographic Adventure
Undersea Journal
Sport Diver

Contributor to numerous Tech Diving publications

FILM AND TELEVISION:
Credits for more than 30 various productions including the PBS production of *Water's Journey* a documentary series that takes viewers on a journey through the world's greatest water systems.

For more information on Jill Heinerth, visit her web sites:
www.IntoThePlanet.com
www.RebreatherPro.com

Have Rebreather, Will Travel

'Building a strong pillar to support the new rebreather revolution?

Text by and photos courtesy of Jorge Antonio Mahauad

As the word, *rebreather,* gains readership in diving magazines, brings novelty to shows and fills the mouths of renowned instructors many industry professionals are thinking of "rebreatherizing" themselves. This is predictable, as the rebreather has been hailed as the "greatest diving innovation since the regulator".

The fact is that in the advent of a new wave of recreational rebreather divers and the industry trend of making rebreather diving more available, many manufacturers are envisioning their own consumer rebreathers in the short and mid-term. At the same time, several recreational diving instructors wait for the "approved" units to come out while others are "taking the plunge" on units like the Poseidon MKIV. It is reasonable to think that a greater number

of dive centers will be willing to analyze the option of providing support services to rebreather divers in the near future. In this regard, it is highly likely that offering a wider range of services will become a source of competitive advantage as the recreational rebreather market expands.

It is reasonable to think that a greater number of dive centers will be willing to analyze the option of providing support services to rebreather divers in the near future.

In the last decade, technological advancements have allowed this futuristic technology to include automated mechanisms that will override and prevent reasonable user error. In addition, training to reduce the so called "human factors" is being designed, and it is expected that the application of multi-level sensory learning systems of proven educational value will help develop simple response mechanisms for quick bailout procedures to virtually eliminate fatalities. Nonetheless, many challenges lay ahead as the travel and leisure component is still undeveloped and underestimated as one of the pillars of this so called "new revolution".

So far, the additional business or the competitive advantage created by having a recreational (meaning no decompression, maximum 30 meters diving) rebreather operation have not overcome the extra work, expenses and potential liability that come with it, and some changes from manufacturers and training agencies are still needed in order to effectively develop the recreational rebreather travel sector.

In this article, I will try to list, expose and explain the components of rebreather travel and the general challenges the dive travel and leisure model faces. Hopefully, this will be of interest to manufacturers and training agencies that are willing to listen to others as part of their product development process. I think that this article can also be of value for the travel professionals thinking about getting into the rebreather market and to the people making decisions that will make such "evolution" happen.

Investment

Let's start from the beginning. Investment in developing, marketing and distributing rebreathers has increased in the last few years. It is foreseeable that this increased expense will create a greater number of opportunities and that diving instructors will provide training for many new entry level or "recreational" rebreather divers. If the equipment sales model is maintained, many of the new divers will eventually buy a rebreather.

Some changes from manufacturers and training agencies are still needed in order to effectively develop the recreational rebreather travel sector.

As the recreational rebreather diver spends money on a rebreather and develops skill, a new market for the rebreather traveler will develop. This new market will probably combine the well publicized destinations for recreational diving and the more specialized attention required to support a number of traveling rebreather divers.

Eventually, as recreational rebreather diving becomes an interesting product line for dive operators, a considerable amount of extra expense will be needed for diving service providers in the sector in order to cope with the base line for rebreather support and increased volumes of divers. As a result, additional investment in infrastructure, equipment and education will be required from the service provider intending to provide high standard facilities for rebreather divers.

Rebreather-friendly

Obviously, this investment will have to be offset by the benefits that serving rebreather divers will bring to the dive operator. But what are those benefits? What is worth the hassle and extra workload that rebreather divers create? Let's take a look at the current rebreather travel model and work it from there.

A place where rebreather divers are welcome is often called a "rebreather-friendly" facility. So far, these facilities have served the needs of technical divers in general, and some sort of community standard has emerged from the needs and expectations of this niche market.

In order to facilitate the modern closed circuit rebreather diver to a sport diving level, a "rebreather friendly" facility has to provide at least high pressure (200 bar) fills of medical grade oxygen and a reliable supply of oil free (tested), high pressure air. In order to make use of the gases provided, the dive operator will have to stock a range of rebreather tanks and valves, along with a choice of rigged bailout cylinders and regulators, and a stock of soft and trim weights in small increments. In order to comply with what the community now calls "basic support", the rebreather facility will also have to provide a range of CO_2 absorbent mechanisms such as grain or cartridges.

In addition to these basic features, a rebreather minded operation needs to provide certain infrastructure that includes a safe, somewhat private, well ventilated, cool, clean and grease free area for assembling and storing rebreathers. In addition, a dedicated space and water hose for rebreather rinsing is important; this area does not need to be exclusive, but it cannot be the same

A "rebreather friendly" facility has to provide at least high pressure (200 bar) fills of medical grade oxygen and a reliable supply of oil free (tested), high pressure air

Supervision is not easy with a group of bubble-less divers who are able to stay down for a long time

Procedures for entering the water will often require flexibility

used for rinsing wetsuits, BCD's, etc. There is nothing such as a rebreather "rinse tank".

Special care

Areas with changing currents, big waves, strong winds, open ocean locations, bad visibility or any other conditions that could be considered potentially (and reasonably) dangerous will have to provide special care if the rebreather-friendly operation offers boat (or supervised) dives.

Positioning

In my opinion, the rebreather operation should be able to estimate with reasonable accuracy the position of rebreather divers underwater depending on the currents, runtime and bottom topography for a standardized dive plan at any given time. On the other hand, a high tech solution to perform this task would be ideal and have great sales potential.

The challenges of providing the diver with underwater GPS, EPIRB and surface communications are well known and technology will eventually develop and provide this in a single, pocket sized, standalone and affordable device that is user-friendly and available on the consumer market. With time, such a device will become standard "support technology" for rebreather diving and traditional devices (DSMB's, audible surface aids, etc) will be carried as manual backup mechanisms.

There is nothing such as a rebreather "rinse tank".

Special needs

Aside from the "non-rebreather" technological needs of the travel professionals to serve rebreather divers, the staff of a CCR-friendly operation also needs to fully understand the principles of rebreather divers, be knowledgeable about a variety of units and be able to fulfill the customer's unique needs. This is easier said than done, and many so-called travel specialists often do not understand that rebreather divers do most things differently.

Consistency

Dive operations offering guided dives will need to ensure that their guides are diving rebreathers consistently, that they are appropriately trained to assist on a rebreather emergency, and that they have top of the line understanding of physiology, equipment, underwater techniques, dive planning, etc. Guides will also need to understand that individual attention is essential; CCR divers cannot be rushed to get in the water, cut short on runtimes or be casually mixed with open circuit divers.

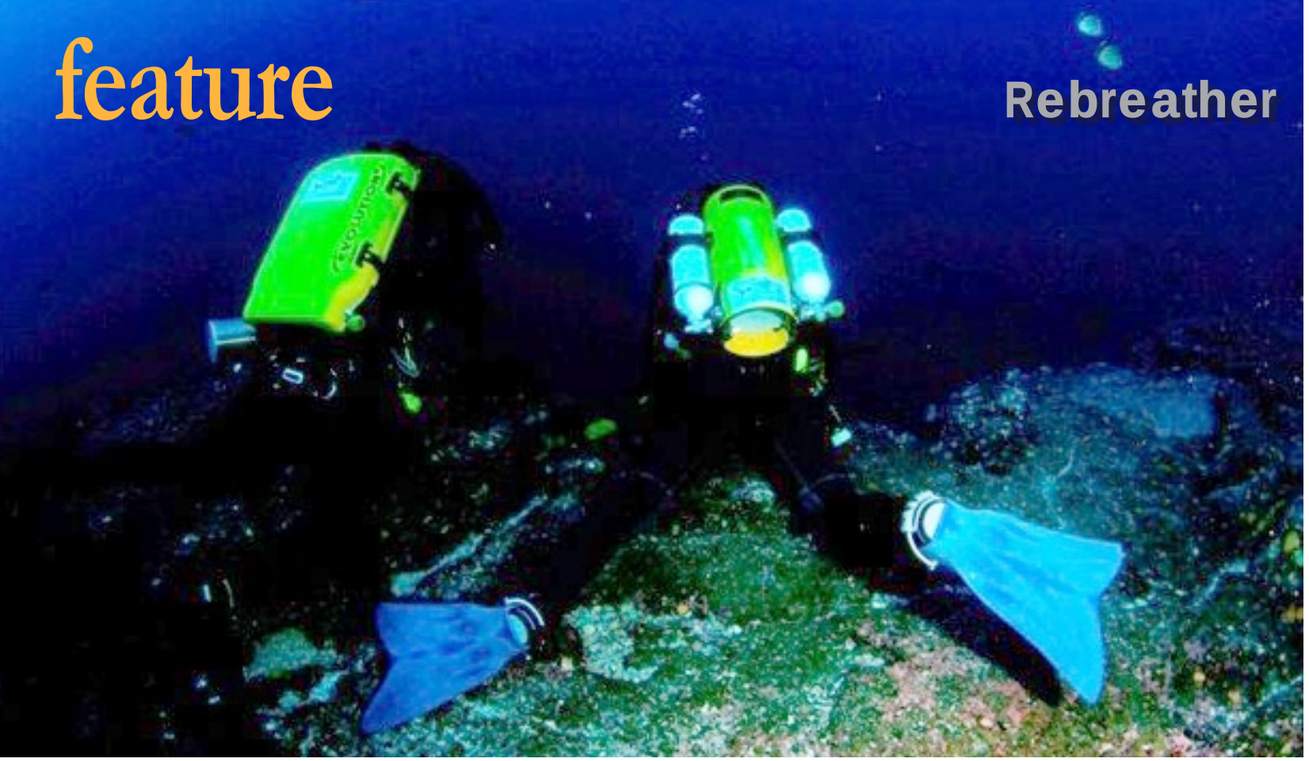
Procedures

The dive center that aspires to be a rebreather friendly operation also needs to revise monitoring and in-water procedures. For example, procedures for entering the water will often require flexibility. Locations where the practice is for "everyone to back-roll into the water at the same time" will have to implement a different approach. Supervision is not easy with a group of bubble-less divers who are able to stay down for a long time; therefore, pre-dive briefings, dive plans and surface support coordination will prove their often forgotten importance in the recreational open circuit diving field. Upon surfacing, tenders should provide a line to clip bail-out or stage tanks to and a long, strong and comfortable ladder with good handholds and safe steps for exiting the water while still wearing the unit.

Many so-called travel specialists often do not understand that rebreather divers do most things differently.

The rebreather facility also needs to offer a basic toolkit to allow servicing and a dedicated retail area offering a range of consumables available for sale that would include as a minimum, disinfectant, fresh cells, O_2 lube, batteries

The rebreather facility also needs to offer a basic toolkit to allow servicing and a dedicated retail area offering a range of consumables available for sale that would include as a minimum, disinfectant, fresh cells, O_2 lube, batteries and reasonable support with some spare parts for the major rebreather models



and reasonable support with some spare parts for the major rebreather models.

Travelling

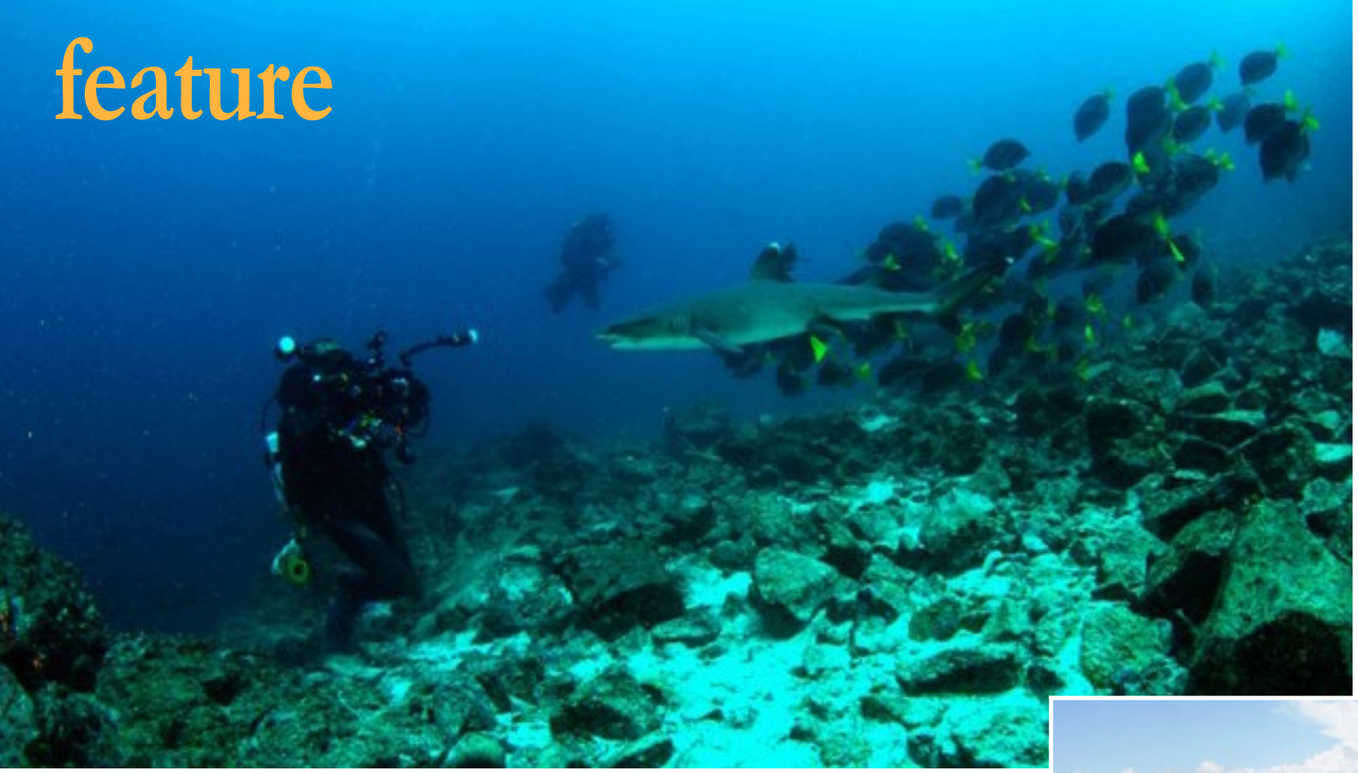
At this point I think it is important to make one clarification. The "requisites" above are not something I have personally authored. They are more of a potpourri of knowledge gathered from reading on line, meeting other divers and supporting some rebreather people. It is my experience that, although the process is often painful and full of uncertainty, if rebreather divers find some of those optimal features in a dive operation at an area with something worth diving for, they will slowly start to show up.

Getting there

But for the traveling rebreather diver, the hassle is not over by locating a "rebreather-friendly" dive provider in a nice destination abroad. First, they have to get there, and for such purpose packing, flying and entering a new country is often a tricky first step.

For some time rebreather manufacturers have been doing their best to develop a unit whose weight is approximately the same as a standard single cylinder scuba rig. Unfortunately, that is not enough anymore as weight restrictions have become tighter with more additional luggage fees being charged.

As a result, the rebreather traveler often has to resign him or herself to the use of hard boxes and other protective measures recom-



The expensive and heavy camera equipment that makes owning a rebreather worthwhile will also have to be added to the mix and the average 23 kilo baggage allowance will be quickly doubled or worse.

mended by the manufacturers. This practice reduces the overall extra expense in overweighed luggage but can also jeopardize the integrity of a very sensitive life support device. In any case, the expensive and heavy camera equipment that makes owning a rebreather worthwhile will also have to be added to the mix and the average 23 kilo baggage allowance will be quickly doubled or worse.

Weight restrictions have become tighter with more additional luggage fees being charged.

Security

A second factor that complicates rebreather travel is airport security. As the world's flights become "safer" every day, the list of restricted and suspicious items grows longer. Depending on where you travel from or to the terms rebreather, oxygen, gas cylinder, cell or solenoid can be very attractive to security officers. In addition, many components of a rebreather are not meant to be disassembled manually or require special tools and procedures for such purpose.

Even though short warning labels should be enough to keep the hands of the curious recreational rebreather owner away from something potentially dangerous, the special tooling or signs will not prevent the security screeners from using whatever is at hand to pull apart and examine a unit. Just Google "rebreather tsa", and you will find the most amazing stories of wings being punctured or sliced, items being removed from checked luggage and even whole pieces of luggage being confiscated for further investigation.

Try to explain...

When talking about traveling abroad one last challenge is still to be handled. Overweight luggage that has an "inspected" tag on it and that will look specialized and expensive in an X-ray scan will draw attention from the average customs officer. Trying to explain what this machine does, how much all the gear is worth or what you will do with all this is something that often complicates things a bit further.

All the challenges listed above are common to the individual that travels with scuba equipment but are often more complicated with a rebreather. The reason is simple; a rebreather is a more complex mechanism. In any case, this article is not about the downsides of rebreather travel but about the real challenges that the traveling rebreather diver has to face and how we, as travel professionals in the rebreather diving market, need to provide solutions for our customers.

Many conventional scuba equipment manufacturers have developed travel oriented gear

Tips

If we benchmark the regular scuba travel business a few tips are available. First, the traveler usually has real time access to information that allows "smarter packing"; in addition, many conventional scuba equipment manufacturers have developed travel oriented gear that is extremely light and compact. In the travel sector, some dive operators have created rental programs that provide to the experienced diver traveling light and to the entry level student different equipment lines. With this reasoning, maybe the best direction for the rebreather travel market would be to develop and offer lighter rebreathers and to standardize rebreather rental pro-

grams that could be provided by the so called rebreather friendly facilities. Again, this is easier said than done.

A rental scuba regulator will always work in the same way and there is no special training required to use a particular model; moreover, if the diver's brand of choice is not available for any reason, there is always the option to grab anything working "fairly okay" and still make a couple of dives. On the other hand, rebreathers require unit specific training and dedicated top of the range servicing in order to be in a condition to conduct safe dives consistently.

High investment

If a rebreather facility wants to provide rental units and serve all the potential combinations of rebreather models, the investment needed is very high. On the other hand, if a particular rental rebreather is not available, or if the unit is not supported at a destination, this will personally affect a diver who committed a considerable amount of money in a brand of choice. This situation is never good for the brand and will hurt the relationship with the costumer in the long run because the customer will have to either change brands or choose a different destination. If the customer still wants to dive that destination and the required rental units are definitely not available, then we are back to the original travel, safety and weight issues.

Maybe the best direction for the rebreather travel market would be to develop and offer lighter rebreathers and to standardize rebreather rental programs that could be provided by the so called rebreather friendly facilities

Despite the increased expense in product development and marketing of rebreather related subjects in the last few years, this important issue remains mainly unaddressed. The "bubble-less dream" of a manufacturing industry providing technology and training without the travel pillar in place somehow resembles what happened back in the mid 1990's with a "first wave" of semi-closed rebreathers that did not succeed completely in the market. I think that the rebreather travel market strongly developed back then and that the industry professionals making the "new" revolution happen need to take this into account now.

Program development

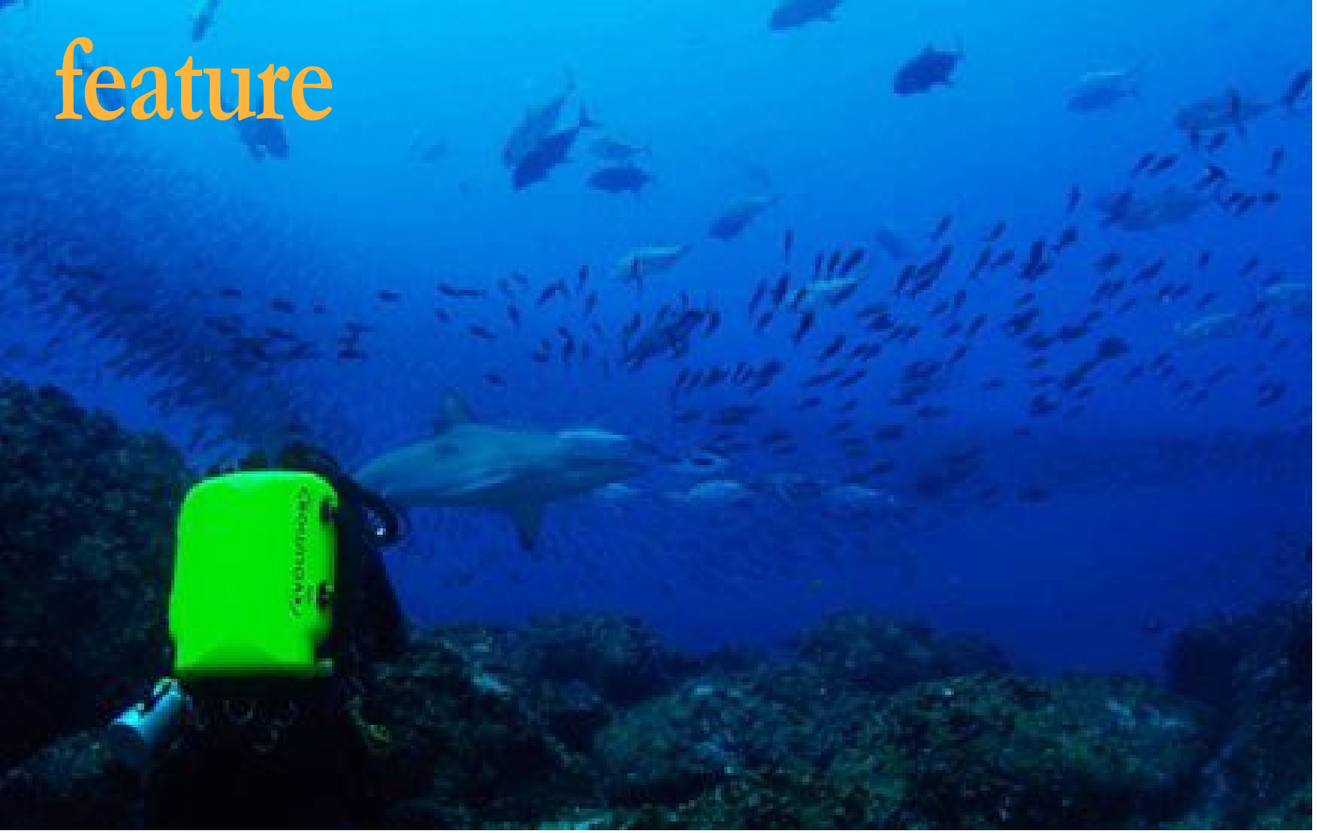
In my opinion, if the rebreather revolution is to be successful this time, rebreather manufacturers need to approach travel specialists all over the world in order to develop a rebreather rental program very quickly. This program will have to provide options and support to the dive operators who want to include their units as part of the "menu" on offer. I know of at least one company that has something in this fashion but a common effort is needed to make it a trade standard in the rebreather market. Another step towards the development of this third pillar of the recreational rebreather model is standardization.

Simple things like the scrubber mechanisms have variations in size, duration, specification, and packing from one rebreather to the next. Cylinders and valves are other examples. Usually when diving open circuit, a DIN to Yoke adapter or valve insert will be everything a diver will need to fit a regulator in a cylinder. Rebreathers don't work that way. Many rebreathers require a specific size of cylinder and type of valve to fit properly. Modifying such configuration will usually alter the learned response to potential problems, invalidate certifications or simply make diving impossible. Even small consumables such as batteries, oxygen cells, tools, "o" rings, mushroom valves and fittings will not work from one unit to another proving the task of providing "reasonable support with some extra spare parts for major rebreathers" more complicated than initially thought.

Many rebreathers require a specific size of cylinder and type of valve to fit properly.

Benefits

Aside from the technicalities of rebreather travel one last aspect remains.



How much more revenue can a rebreather diver create (over the more conventional open circuit diver) in order to make this profitable to the dive operator at a travel destination? Is the investment in training, infrastructure, consumables, rental rebreathers, gasses and logistics worth the rewards?

Can the manufacturing and training sectors of the industry support travel professionals to make it worthwhile? I know profitability depends on the particularities of every region and business model, but I think we can talk about potential trends.

Initially, the benefits of supporting rebreather divers will probably be collected by charging a "premium fee" and by gaining reputation and competitive advantage over the other dive shops, just like what happened with the premium fees and "specialized" equipment sales that the use of Nitrox produced back in the late 1990's and early 2000's.

But as the market matures these extra margins will eventually decrease and being rebreather-friendly will probably become mainstream product component, just like what made nitrox a "free gas" in many dive operations today.

At this stage, questions about economical sustainability of this could come to mind. Aren't we deliberately reducing the price competitiveness of the "scuba diving industry" by making "diving" more complex and by including extras to a sector with already low average profitability?

Things are changing very quickly in the rebreather world these days. Maybe by the time this text is published, half of the information here will be obsolete or inaccurate. On the other hand, as the rebreather travel market expands, the challenges and complications will increase and an unhappy scenario for manufacturers and training agencies could result if the travel component is not there to provide what they promise.

I think that if we are going to make this rebreather revolution happen, more cooperation and communication with the travel destinations as a sector will be needed. Maybe the upcoming rebreather forum 3.0, RESA, and other industry initiatives will address and proactively advance this exciting new frontier in diving. ■

Jorge Antonio Mahauad is a PADI/DSAT Master Instructor, Trimix Instructor and Evolution rebreather diver based in the Galapagos Islands.

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W30

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marine mammals

Edited by
Kelly LaClaire

Increased fin whale sightings encourage scientists in England

The massive yet illusive fin whale is classified as an endangered species, but marine research by the Sea Trust showed they be making a slight comeback as pods of the gentle giants are swimming into waters off Pembrokeshire (southwest Wales) each year in larger numbers than ever before.

Scientists are very excited as sighting such as these, while obviously important for research, are a truly unique experience. Adult fin whales can weigh anywhere between 30 and 80 tons, grow to more than 90ft (27m) and are the second largest animal on the planet. Their tongues alone can weigh more than an African elephant.

"It's one of the planet's most spectacular wildlife events," said Sea Trust coordinator, Cliff Benson. "In the past, we had seen one or two, and back in 2005, a group of four, but they now seem to be arriving in much greater numbers. In 2009, we came across at least 20 with massive blows appearing all around us as far as the eye could see, along with animals feeding around the boat."

Despite heavy seas, volunteers from the trust were recently sent out on a fact-finding mission and captured footage of a school of at least 12 whales feeding on massive shoals of fish about 30 miles off shore near the Pembrokeshire islands.

"We had at least 12 feeding all around us, and one passed so close in front of us [we] had to slam the engines into reverse to avoid collision," said Benson.

Records of the sightings will be passed to the European Defense Agency as part of a protection of marine mammals project.

Benson added, "The project aims to protect marine mammals against the impact of active sonar deployed by European navies. This could save the lives of many of the whales and dolphins that inhabit our waters.

"We are keen to work closely with the military to prevent incidents such as the one off Cornwall which killed more than 20 common dolphins which stranded on the coast after a naval exercise a couple of years ago."

Man-made ocean noise, from shipping, oil and gas excavation and naval sonar, is thought to make it ever harder for whales to navigate, communicate, find food or mates and avoid prey. ■ Source: BBC News

Scientists concerned over inbreeding among orca pods

New data published in the Journal of Heredity, National Oceanic and Atmospheric Administration (NOAA) researchers and others, using DNA testing of killer whales have discovered that some of the juveniles they studied were the result of mating within the same pods that are part of the overall population.

The study focused on an endangered population of orcas known as the Southern Resident killer whales whose range includes British Colombia, the Puget Sound and parts of the Oregon and California coasts. They number only about 85 individuals and live in three distinct groups called J, K and L pods. (It helps to think of an orca population as a very small town and a specific pod as a large extended family within that town).

It was long thought by scientists that these orcas did not mate with members of their own pod but instead only mated with whales from the other two pods in the population, but new DNA research is now bringing to light occasional inbreeding practices among inter-pod males and females.

One concern and possible implication of this breeding behavior is a significant reduction in the genetic diversity of what is already a perilously small population of animals.

Inter-pod mating has never been detected in previous studies of Northern Resident killer whales, a separate population of killer whales which range from Washington to southern Alaska, and until now researchers assumed that Southern Residents exhibited similar mating patterns. The two populations are distinct and do not socialize or mate with each other.

The study entitled, *Inferred paternity and male reproductive success in a killer whale (*Orcinus orca*) population*, involved researchers from NOAA's Fisheries Service, the University of Washington, Cascadia Research Collective and the Center for Whale Research.

"We were surprised that, in many cases, the father was from the same pod as the mother," said Dr Michael Ford, lead author of the study and a scientist with NOAA's Northwest Fisheries Science Center in Seattle. "Based on earlier studies, we didn't think killer whales mated within their own pod. This behavior may be unique to the Southern Resident population, perhaps related to the population's small size."

The researchers analyzed 78 individuals for 26 different genetic markers, or DNA fingerprints, and determined the paternity for 15 mother-calf pairs. The study found no evidence that Southern Residents mate outside their population, but clear evidence that they do sometimes mate with members of their own pod.

"Even though some of the fathers were in the same pod as the mothers, none of them were really closely related to each other. Our results suggest that Southern Residents avoid mating with their siblings or parents, but we aren't really sure of the social process that results in this avoidance," Ford said.

Another surprising finding was that a multitude of males within the Southern Resident community are responsible for offspring production in the population rather than just one or two. This contrasts with some other marine mammals like elephant seals, where very few males completely dominate the breeding in a large group. Researchers think this may reflect the difficulty male killer whales have in controlling other males' access to females during mating season.

However, the study also showed that the older and larger males appeared to be responsible for most of the successful mating indicating that females may choose to mate only with older males, or possibly that older males may somehow be preventing the younger males from breeding.

Ford said he and his colleagues are particularly worried about the Southern Resident group's lack of genetic diversity, which he characterized as a kind of bottleneck. "Since this population remains isolated from other killer whale populations, mating within pods puts Southern Residents at risk of genetically deteriorating further from a potential increase in inbreeding or harmful mutations," he said. ■

SOURCE: NOAA

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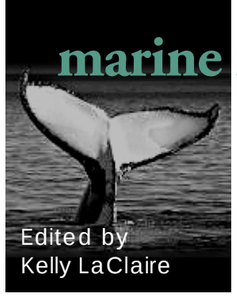

Edited by
Kelly LaClaire

Whale washes ashore: Necropsy reveals gunshot

On September 24, a ten-foot-long, short-finned pilot whale was found washed ashore and stranded on a community beach in Allenhurst, New Jersey, USA.

According to officials at the National Oceanic Atmospheric Administration the necropsy, performed at the University of Pennsylvania, revealed a bullet from a high-powered rifle or handgun lodged in the whale's jaw. Examiners say the slug shattered the 700-pound whale's jaw and fractured several more bones in its skull.

The necropsy also determined the whale—believed to be a juvenile—died a lingering death brought on by a massive infection that made it impossible to eat. "The whale literally died of starvation," said Bob Schoelkopf, director of the Marine Mammal Stranding Center who originally found the animal. "It probably traveled quite a distance before it became so weak that it washed ashore." Schoelkopf added that the whale was still alive when it washed up in Allenhurst, but died a short time later.

Officials at the Office of Law Enforcement for the National Oceanic and Atmospheric Administration (NOAA), who are now investigating the matter, say it's still not clear when, where or why the shooting occurred but did say the bullet was sent for ballistics testing at a federal lab in Seattle. Scott Doyle, an assistant special agent for NOAA, said they generally investigates "two or three" shootings of dolphins and seals each year, but this is the first time he can remember a whale being shot in his 25 years on the job.

Whales and other marine mammals such as seals and dolphins are protected under the 1972 Marine Mammal Protection Act, which prohibits them from being "harassed, hunted, captured, killed or collected". Violations can result in penalties of up to US$100,000 and imprisonment for up to a year.

NOAA is hoping that "someone with a conscience" who witnessed the shooting from a boat will come forward with information about the incident, Doyle said. Officials also have no idea if the shooter was on a commercial vessel or a recreational boat, but they said there is likely a witness because there is usually more than one person on these vessels. ■ SOURCE: ASBURY PARK PRESS, TIMES UNION

Whale sighting a first in the United Kingdom

A marine research charity has confirmed a small whale found beached near Penzance (a small port town in the county of Cornwall in Southwest England) was in fact a dwarf sperm whale. The small whale, barely larger than a common porpoise, recently swam into Mounts Bay and somehow became beached.

Luckily, the tiny whale was soon sighted by residents on the sand and quickly reported to the coastguard and the Cornwall Wildlife Trust.

A very brave and heroic townsperson managed to get the small whale back into the sea before it died and residents watched it swim away.

Dr Peter Evans, Director of Sea Watch, said the species had never previously been recorded off the U.K. coast. This confirmation means that 29 species of cetaceans have now been recorded in U.K. and Irish waters.

Extremely rare, almost nothing is known about these animals, so any new findings are exciting. "Pictures of the Penzance whale show it to be a dwarf sperm whale, its fin being large and almost triangular," said Evans.

"This species has been recorded on only a handful of occasions in Europe, including Spain and France, and never in Britain or Ireland.

"It is just one of the increasing number of records of warm water species to be turning up around the British Isles in recent years." ■ SOURCE: BBC NATURE

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U.S. Navy halts underwater explosives training after dolphin deaths

The United States Navy said it has temporarily halted use of time-delay underwater bombs for training in the waters off San Diego, California, after an incident that killed three long-beaked dolphins.

According to official Navy reports, an explosive disposal unit arrived at a training location known as the Silver Strand off the Southern California coast and set a charge with a 15-minute time delay on the ocean floor. After ten minutes, safety observers from the training vessel spotted a pod of dolphins entering the blast area.

With only five minutes remaining before the explosives detonated, the disposal unit felt they did not have enough time to safely enter the water and retrieve the bomb and as a last resort tried to maneuver a dive boat between the detonation area and the dolphins in attempt to chase them away.

Unfortunately, their efforts were unsuccessful. Three common dolphins were killed by the blast.

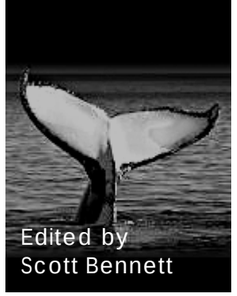
According to Cmdr. Greg Hicks, a spokesman for the Navy, underwater explosives are important for clearing obstacles out of harbors so ships can enter. When the Navy practices with them offshore, Hicks said observers look for dolphins, seals, whales and similar creatures that might swim into the danger zone.

The National Marine Fisheries Agency, who is conducting an official investigation alongside the U.S. Navy, said they will take another look at the United States' pending request to disturb marine mammals off San Diego, in what the Navy calls "a realistic venue for amphibious training and special warfare tactical training in the coastal environment". The existing application, however, doesn't anticipate dolphin deaths related to training however.

The fisheries service also raised the question whether the Navy violated the Marine Mammal Protection Act of 1972, designed by Congress to protect dolphins, whales and other marine life.

"We have an excellent track record in our training and have exacting standards that we apply to try to prevent these types of incidents," Hicks said. "We do our best to protect marine life while conducting essential training."

Environmentalists and fisheries experts could not recall a similar incident in Southern California but are calling for the Navy to take more protective measures during training. ■ SOURCE: SAN DIEGO UNION TRIBUNE



"This is an incredibly fascinating discovery as there have only been three new dolphin species formally described and recognized since the late 1800s."

Tursiops australis, commonly known as the Burrunan dolphin

New dolphin species discovered in Australia

Researchers determine that dolphins found in southeastern Australia represent a previously unknown species.

Newly described species differs greatly from other dolphins worldwide.

Researchers at Melbourne's Monash University have determined that dolphins residing along the South Australian coast are in fact a new species. The discovery was made by Kate Charlton-Robb, a PhD researcher at the School of Biological Sciences at the university. The remarkable discovery, published in the latest *PLoS ONE Journal,* reveals that coastal dolphins in southern Australia differed greatly from other dolphin species worldwide. Until now, approximately 150 of the dolphins living around the Melbourne area had been assumed to be bottlenose dolphins.

The new species has been, formally named *Tursiops australis*, with the common name of Burrunan dolphin, derived from the Aboriginal Australian meaning "large sea fish of the porpoise kind". The recognition of *T. australis* is significant, as the new species is confined to a small geographic region of southern and southeastern Australia where only two small resident populations reside.

This research relied heavily on the analysis of dolphin skulls collected and maintained by museums over the last century, including Museum Victoria in Melbourne. Detailed DNA analysis revealed that the dolphins differed from that of known bottlenose species *Tursiops truncatus* and *Tursiops aduncus*.

"This is an incredibly fascinating discovery as there have only been three new dolphin species formally described and recognized since the late 1800s," Charlton-Robb stated. "What makes this even more exciting is this dolphin species has been living right under our noses, with only two known resident populations living in Port Phillip Bay and the Gippsland Lakes in Victoria state. In fact, now that it is recognized as a separate species it may immediately qualify under Australia's criteria for endangered animals," she added.

Charlton-Robb said it is important this study continues in order to conserve and protect the Burrunan dolphin for future generations. More research is required to determine if there are other resident populations of this species in Australia. "The formal recognition of this new species is of great importance to correctly manage and protect this species, and has significant bearing on the prioritization of conservation efforts," the authors wrote. "This is especially crucial given its endemism to a small region of the world, with only two small known resident populations." ■

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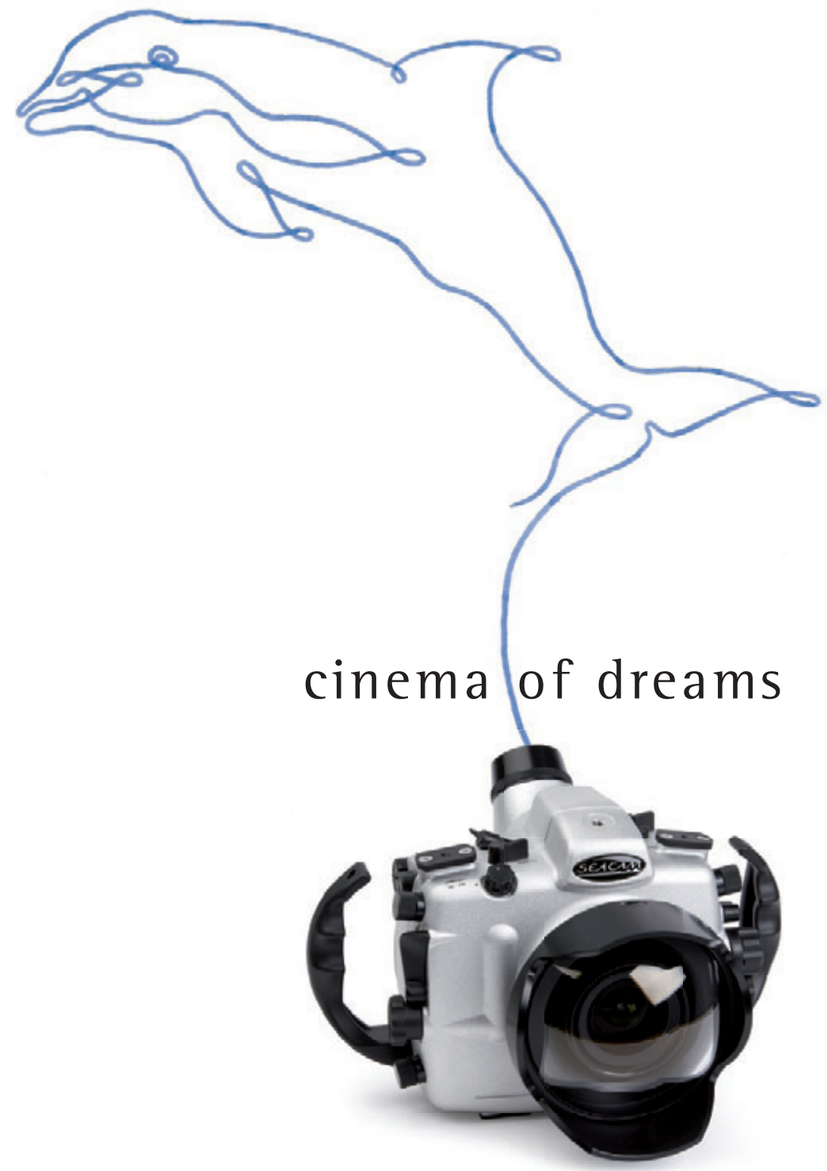

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