

# Opinions

Letters &

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Edited by  
Millis Keegan

KURT AMSTER



I have received some questions regarding turtle nests, and how we can best protect them. One of the questions mentioned Gary Appelson, who turned out to be the Policy Coordinator for the CCC organization. CCC stands for Caribbean Conservation Corporation, which most likely is the oldest sea turtle conservation organization in the world. So, I figured, who better, you know? I contacted him.



I asked him straight up, "Are we the turtles' worst enemies?" And Duh! Of course we are.

**Gary Appelson:** Sea turtles have been around and were doing just fine for millions of years, until people arrived. People are definitely their worst enemy!! Adult sea turtles have almost no predators except sharks, which rarely actually kill a sea turtle. Many predators eat hatchlings, but the predation is simply overwhelmed by the sheer number of hatchlings that actually make it to the water. That is why turtles nest multiple times each year and lay so many eggs; it's nature's insurance against predation.

**Millis:** I found some numbers that say that Florida is the number one place for turtles to nest—that 80 percent of the sea turtles in the world actually make it over here.

## Save the Sea Turtles

Sounds like a high number; is it valid?

**Gary Appelson:** Ninety percent of all sea turtle nesting in North America takes place in Florida. One hundred percent of all green and leatherback nesting in North America occurs in Florida. About 25 percent of all turtle nesting in Florida occurs in the Archie Carr national Wildlife Refuge in Brevard and Indian River Counties on the mid Atlantic coastline. Loggerhead turtle nesting in the refuge is very intense, and the refuge hosts one of the two largest, if not the largest, aggregation of nesting loggerheads in the world.

But there are turtle nesting beaches in many locations in the tropical Atlantic and Pacific. The largest green turtle nesting population in the world is adjacent to our research station in Tortuguero, Costa Rica. CCC is credited with saving this nesting population from extinction—a great conservation success story!!

**Millis:** So, not quite 80 percent of all the turtles in the world then, but the numbers are still impressive. Impressive enough to name Florida the Capital Turtle State in the US, we think.

### Questions

**Q:** How does one protect a turtle nest?

*Something wonderful has happened! We own a beach property in Florida,*

### What do you think?

Get heard! Send us your opinion at [diveguru@xray-mag.com](mailto:diveguru@xray-mag.com) by May 10, 2007, and get a chance to win a gift certificate for US\$30 for a great dive shirt generously sponsored by Dive Junkie. [www.divejunkie.com.sq](http://www.divejunkie.com.sq)

*and this week, late one evening, a turtle came crawling up on the beach. She crawled with quite some effort, and at first, we thought she was sick, but then she started digging and laid eggs—about 60 of them. It took hours. We watched the whole process from a distance, careful not to disturb her. It was wonderful, and it brought tears to my eyes. Now, obviously, we want to protect the nest. Our first instinct was to mark the nest, thinking that beach goers would stay clear from the area. Then a neighbor told us not to do that, since that would just be like setting up a sign for turtle egg poachers. We feel responsible for our nest, and we do not want anything to happen to the turtles. How can we help?*

—Molly, previously a snowbird, bird now retired in Florida

*(Editors note: The term Snowbird is used to describe people who spend a large portion of the winter in Florida or any other warm place in the sun belt region.)*

**Gary Appelson:** It is illegal under Florida law and the Federal Endangered Species Act to harm, harass, kill or disturb marine turtles or their hatchlings. It is also illegal to disturb the nest in any way. While residents and tourists often feel compelled to help hatchlings get to the water, it is illegal to do so. If residents want to ensure that a nest is adequately pro-



Our DiveGuru sponsor this issue is Dive Junkie based in Singapore since 2003. They are a fast growing specialty retailer of stylish scuba clothing and distinctive casual apparel in unique and interesting styles depicting the attractions of scuba diving and the unique experiences of divers. They plan their collections with great care and thought. And their range of clothing is constantly revitalized with new designs and styles on a regular basis in order to keep up with current themes and fashion trends. The Dive Junkie aesthetic is about connecting the unique experiences of divers with artistic designs, combining elements of comfort with great styling, and versatility with fashion and colour. They are also committed to giving divers superior products, and place a great emphasis on the quality and durability of their products capturing the diver's adventurous spirit, revelry and fun-loving nature. Dive Junkie apparel is available in a wide range of sizes sold in Singapore, Malaysia, Indonesia, Korea, U.A.E, Australia, New Zealand, U.K., Greece and the United States through retail stores. Online store T-shirts have sold to customers in Hong Kong, China, Japan, Norway, France, Spain, Belgium, South Africa, Finland and Gibraltar. ■

## How You Can Help: Adopt A Sea Turtle!

Sea turtles have navigated the earth's oceans for more than 100 million years. In the last half century, scientists have learned a great deal about their habits, but many mysteries remain. Join CCC and its Sea Turtle Survival League today!

### Adoption Options

#### Satellite-Tracked Turtle

Several named turtles with satellite transmitters attached to the back of their shells are monitored by the Caribbean Conservation Corporation. This allows CCC to use space age technology to learn more about the turtles migratory behavior. Adopt a satellite-tagged turtle and track the turtle's movements through their website! You can find out which satellite turtles are available for adoption by checking the current list of **Satellite Tracked Turtles For "Adoption"**.

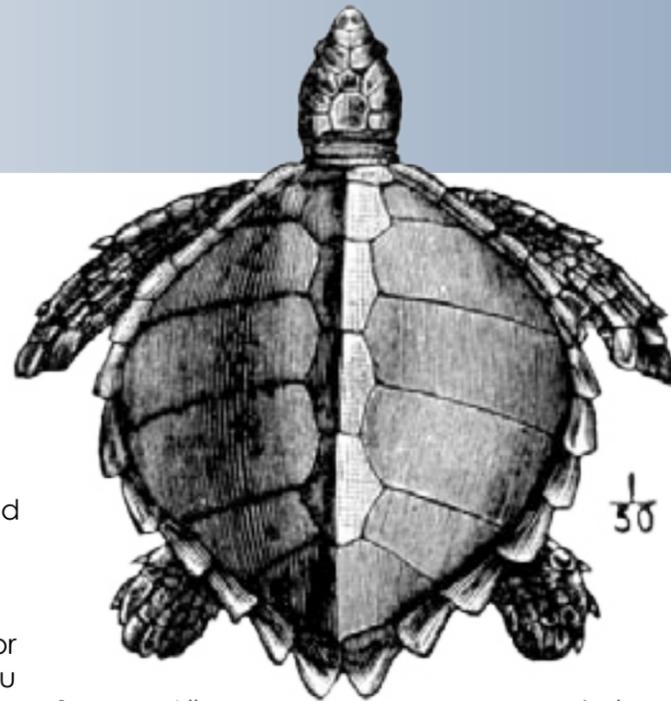
#### Name Your Own Turtle

Adopt one of the several turtles CCC researchers tag on the hot sandy beaches of their Costa Rican research station. With a Name Your Own Turtle Adoption, you will be the only person to adopt your turtle, and you can choose the name of the turtle. If CCC sees your turtle again, they will notify you via newsletter. ■

tected, they need to contact an authorized "sea turtle permit holder." Marking a nest may actually put future hatchlings at increased risk. Female adult turtles do a very good job of disguising their nests. In Florida, only individuals trained and permitted by the state are authorized to directly interact with marine turtles or their nests. Authorized permit holders, either volunteers or local government staff, monitor all nesting beaches in Florida. You can contact local government environmental officials to report a nest.

The best way to help protect turtles and their nests is to follow all the guidelines for limiting your impacts. These guidelines can be viewed on the Florida Fish and Wildlife Conservation Commission website at <http://myfwc.com/seaturtle>. You can also support a sea turtle conservation organization such as the Caribbean Conservation Corporation/Sea Turtle Survival League, [www.cccturtle.org](http://www.cccturtle.org).

*Question: How come there is a market for turtle eggs? What do they want the eggs for that an chicken egg can't provide? Is it true that the going rate for a turtle egg is 50 cents a piece? That's awful!*



**Answer:** All over the world people eat turtle meat and turtle eggs. Turtle eggs are considered a delicacy and, most importantly, as an aphrodisiac by many cultures. Those cultures are represented in Florida, and consequently, there are people that place a high value on turtle eggs even in the US. In the US, mainly in Florida, there is an illegal black market for sea turtle eggs.

*Question: Gary Appelson, advocacy coordinator of the Caribbean Conservation Corporation said—I think I read it in the papers—that poachers poke a wooden stick or fishing pole into the sand, and if the pole comes out sticky with yolk, it's a fresh nest and ready for harvest. I think you should do something about this, let people know what's going on.*

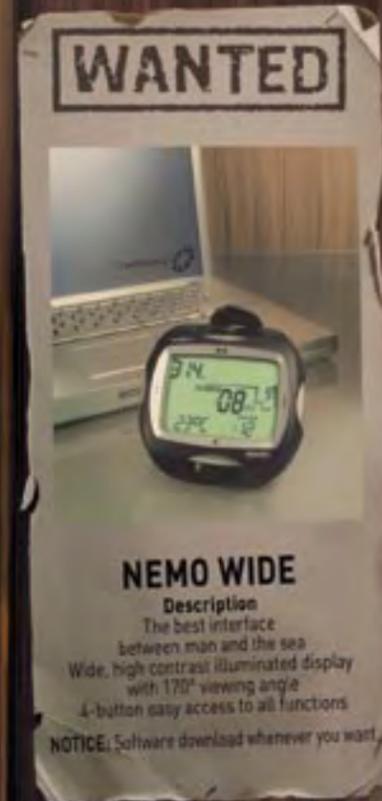
*I also would like to know what I can do, and since I know I probably won't have time to do whatever you suggest, tell me where to send money to help the cause!*  
—Buying a concious-Johnny,  
Tampa.

**Answer:** To answer your second question, yes, you can be directly involved in sea turtle conservation by buying a Florida Sea Turtle Specialty License Plate ([www.helpingseaturtles.org](http://www.helpingseaturtles.org)), joining a sea turtle conservation group like the Caribbean Conservation Corporation ([www.cccturtle.org](http://www.cccturtle.org), phone-352-373-6441), or by simply just donating money to a sea turtle conservation group. All the money generated from the sale of the sea turtle specialty license plates goes directly to sea turtle conservation in Florida! See Tracked Turtles For "Adoption". ■

## BIO for Gary Appelson

Gary Appelson graduated from college with a BA in Political Science with a specialty in Environmental Policy. He has a masters degree in Wildlife Ecology and Conservation from the University of Florida. He joined the Gainesville-based Caribbean Conservation Corporation as its Policy Coordinator in 1999. Appelson is currently involved in all aspects of sea turtle conservation and policy and is a registered lobbyist in Florida. He monitors the laws and regulations impacting coastal policies, the coastal environment and sea turtles. Appelson watchdogs the state's regulatory program for coastal construction, beach nourishment, coastal armoring and other activities impacting the beach, dune and near shore environments. CCC is currently in the forefront of the debate calling for coastal management policy reform and increased protection of coastal and near shore resources in Florida. In 2005, Appelson served on the Coastal High Hazard Study Committee, a 19-member governor-appointed committee to look at the need for coastal policy reform with an emphasis on balancing coastal development with resource protection. Appelson filled the only environmental position on the committee. He currently serves on the steering committee of the newly formed Oceans and Coastal Alliance. The alliance is a group of national and Florida-based conservation organizations focusing on coastal and marine resource protection issues. ■

The daily journal of life in and around water  
**UnderwaterTimes.com**



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**POINT & CLICK  
ON BOLD LINKS**



Edited by  
Millis Keegan  
& Peter Symes

# Heaven sent Equipment



## Data directly in your mask

The DataMask HUD from Oceanic, with the air-integrated dive computer built directly into the mask has so far only been available for the military. Soon, it will be released to the public. With the digital optic system, you can clearly see the information you need, but still be able to focus on the dive, and it does not matter if viz is bad.

[www.oceanicworldwide.com](http://www.oceanicworldwide.com)

## Roll the Bag

This padded roller dive bag comes with a regulator bag. Made out of sturdy material, reinforced box-stitching and corrosion-resistant locking slides and pulls, this bag might last you a lifetime. Lots of grab points makes handling it easy.

[www.akona.com](http://www.akona.com)



## Evolved ride

You wanna zip from here to there? You wanna zoom without effort? The new AV2 Evolution has evolved to gold-plated contacts, so you will be traveling in style. But there is a reason for that extravaganza, and it is definitely worth it.

Gold is probably the best conductor of electricity and will not corrode. For the price, you also get an aluminium box to transport the hot scooter after use.

[www.diveapollo.com](http://www.diveapollo.com)



## Color-coded dive

This friendly dive computer, XR-Nx from Aeris has both Air and Nitrox modes, display oversized digits for easy reading, and is designed with color-coded bar graphs for easy reference while diving. When you reach a safety stop, the display changes to a count down display. Hot Swat compartment makes for an easy battery change.

[www.diveaeris.com](http://www.diveaeris.com)



## A Warm Experience

No need to be warm-blooded with this suit that keeps you warm with a panel heated with batteries. The heat can be turned on and off when needed, and it takes only minutes to heat you up.

[www.thermalution.com](http://www.thermalution.com)



## Seac Sub Dry tech

This 5.5 mm drysuits 5.5 is anatomically cut for comfort and comes with large pockets, a sturdy sole boot and protection for the knees. The valves are reliable SI-TECH design.

[www.seacsub.it](http://www.seacsub.it)





## Finest fit

Tailored fit... finest degree at shoulders waist and.. Sounds like a fitting for a tux now, doesn't it? But the stabilizing cradle, which eliminates tank roll and can hold up to four tanks, tells another story. Chest straps are positioned to fit both men and women. [www.apvalves.com](http://www.apvalves.com)

## Bob the hybrid

Feel like a manta ray as you glide over the ocean floor. The SeaBob is a cross between a jet-ski and a bodyboard, a nice little toy for some fun in the ocean. Surf and leap through waves, or take a deep breath and dip down to explore under the surface when feeling like it. You steer yourself along the ocean floor by moving your bodyweight and using your legs. [www.seabob.com](http://www.seabob.com)



## Scout the area

A magic underwater eye allows you to scout the area before a dive. Or if you like to fish, check your hunting ground. While some anglers use Aqua-Vu systems to help them immediately catch more fish, others simply enjoy the excitement of being able to see and learn what's below the surface of a favorite lake. However you define "viewing" fun, the continuing cutting-edge refinements make Aqua-Vu the most potently effective, easy-to-use underwater viewing systems available.

[www.naturevisioninc.com/aquavu](http://www.naturevisioninc.com/aquavu)



## Field of vision

The Favola is a compact mask, with a small internal volume and a wide field of vision, looking up, looking straight ahead and even looking down. Check the patented "double joint" buckles. With the silicone skirt, the mask adapts to most any head. [www.technisub.com](http://www.technisub.com)



## White fins with spring strap

Fit for a wedding, do be this pair of white colored fins. The Bio-fin Pro is made out of 100 percent rubber and promises to reduce muscle fatigue, energy use and air consumption. Just what a bride needs. They come in black for the groom.

[www.apollosportsusa.com](http://www.apollosportsusa.com)



## Wet/Dry

Mesh Gear Bag and Backpack with dry and wet compartments all in one. Drain-hole grommets in the bottom helps excess water run off.

[www.armorbags.com](http://www.armorbags.com)





## The Zeagle combination

A combined regulator and inflator keeps the check-in weight down when traveling. Still, breathing performance has to be top priority, and the manufacturer promises easy breathing at all depths within sport diving limits. [www.zeagle.com](http://www.zeagle.com)



## Use your ocean eyes

With the inverted drop lenses, you get a great downward vision. But the real treat is the easy quick release lense system, that allows you to change to prescription lenses in a few moments, by yourself. [www.cressi-sub.it](http://www.cressi-sub.it)



## V-16

Not cylinders, but the Vortex V-16 can provide speed. The maker promises that it is up to 30 percent faster and more efficient than conventional fins. The design and the use of four material compounds makes the fin light weight and helps to optimize power and reduce drag. [www.oceanicworldwide.com](http://www.oceanicworldwide.com)

## Revamped skin

The Otter Skin MK2 has been revamped for 2007, which means that among other things, it now comes standard with a double back zip, heavy duty latex seals and double knees pads. [www.drysuits.co.uk](http://www.drysuits.co.uk)



## Get the booty

AKUMAL is a nice little boot with a rugged sole that creates a good grip on slippery slopes. [www.cressi-sub.it](http://www.cressi-sub.it)



## A snap & its done

The Eagle goggles bring clarity back to the swim also for those that needs glasses. The optic lenses are individually available in half-step increments from -1.5 to -6.0. [www.aquasphereswim.com](http://www.aquasphereswim.com)

## Minireview: Surface Marker

by Peter Symes



## No more excuses No reel needed

Surface Marker Bouys or Safety Sausages are among the most underrated pieces of equipment. Yet, they constitute such cheap potential lifesavers that it's beyond me why they haven't long since been made a mandatory part of the standard kit. Would you not wear a seatbelt in a car? Enter, this lightweight SMB from SurfaceMarker, and you are out of excuses. It comes in a handy pouch, which is easy to toss into the dive bag and carry in a BCD pocket. Deploying a Surface Marker Bouy isn't exactly rocket science—just get it inflated—yet some have to struggle with it. Despair not. The new two-tone buoy from SurfaceMarker presents an new way to deploy your safety sausage using a "Webbing Deployment System" (WDS). It is a total no-brainer, and you don't need a reel. The WDS consists of a 5.5m long and 2cm wide red and white webbing with a large stainless steel ring at one end and a snap hook at the other. Hook it onto the bouy, slip the ring over the thumb as shown on this drawing, inflate the bouy and, hey presto, it deploys at the surface. Any problems—and you just let the ring slide off your finger.



The bouy is 145 cm tall. While the webbing cord allows for good support during a safety stop, the manufacturer stresses that this is not a deco bouy. Later models will be. ■

## Warm & cozy

A 3-layer undersuit, with an outer wind-proof shell and a nice polar fleece lining will keep the dry suit diver warm and cozy on the inside. A zipped key pocket keeps your car keys in place during the dive.

[www.LomoWatersport.com](http://www.LomoWatersport.com)



## Challenger

Immersion watches are inspired by Italian designs and the brand is a part of the Geco Watch Company. They are famous for their distinct style and high technology.

## Hand held

Bright light leads the way, and size does not matter too much with the Kowalski Mini Xenon. For a compact hand held diving lamp, this little light provides a great shine. Charges externally, because a lamp that always remains closed will not leak easily.

[www.taucherlampen.de](http://www.taucherlampen.de)



## No mystery

Despite the name, there is no mystery with the good field of vision of the Mistique Single Lens, just a good design. This is a low volume mask, that has a double sealed skirt.

[www.deepseeinc.com](http://www.deepseeinc.com)



Balance: new Aero and Back Jac range.

AERO PRO →

BACK JAC ↑

**Cressi**

[www.cressi.it](http://www.cressi.it)

**Back Jac:** Rear inflating jacket with a large volume: 20 kg for size M. Two front foldaway pockets, two rear pockets, adjustable elasticised band. Lock Aid System weight pockets.

**Aero Light:** the new "Travel Friendly" Cressi Jacket, light on weight but full on substance: adjustable shoulder straps, two zip-up pockets. Lock Aid System weight pockets.

**Aero Pro:** Large volumes. Size M: 18.50 Kg. Fully adjustable shoulder straps. Fully adjustable shoulder straps.

**Aero Queen:** same features of the Aero Pro but specific style and anatomy for women. Adjustable elasticised band. Lock Aid System weight pockets.

AERO LIGHT ↑



# whales & dolphins

Edited by  
Peter & Gunild Symes



## Beluga Whales Facing Extinction

The isolated population of beluga whales of Cook Inlet in Alaska should be listed as endangered. Only about 300 individuals remain—a 75 percent drop from 1,300 animals estimated only three decades ago. Biologists concluded the whales have a one in four chance of going extinct within 100 years, according to an official status review released in December.

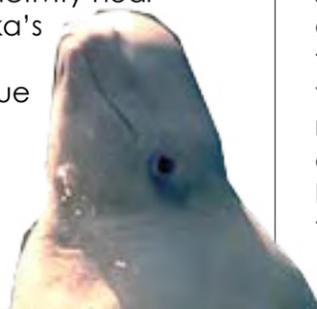
Beluga whales are small, toothed whales that are gray when born and white as adults. According to the fisheries service, they are extremely social and found in groups of between ten and several hundred. Alaska has five distinct populations.

*US Fisheries service proposes endangered listing for Beluga whales of Alaska's Cook Inlet*

"There are few places in the world like Anchorage where a species of whale is as visible, enthralling and accessible as the Cook Inlet beluga," said Mike Frank, attorney for Trustees for Alaska, which represented a dozen conservation groups who have petitioned to get the whales protected. "We need to do all we can to make sure that continues in the future."

The proposal will undergo a year-long review with public comment before written into law, modified or rejected by the agency. Previous attempts to list the whales have landed in the Alaska Supreme Court. This time, the issue will trigger emotional arguments about whether human activity near Anchorage, Alaska's largest city, has damaged a unique whale population isolated from its species since the end of the ice age. ■

NOAA



## Scientists enlist narwhals to collect deep-sea data

For years, scientists have been trying to collect deep-sea data in the ocean north of Greenland where warm, salty water is moving north and cold, fresh water is moving south. The mixing of these elements is of particular interest because it helps regulate the weather in northern Europe. Since some data suggest there has been a warming and freshening of water in the area, scientists are eager

"They basically collect data all the way down on their dive profile and on the way back,"

Over each 24-hour period, a single narwhal diving in the Davis Strait—which connects Baffin Bay in the north to the Labrador Sea in the south—transmits about 410 depth-temperature readings from depths ranging between one and 1800 meters. ■



to learn what this means for the climate models that policymakers are using to determine how the world should respond to global warming.

But the researchers have been deterred by harsh weather in the region. Now they have found deep-diving oceanographers willing to do their work for them: narwhals whose wintering territory is near the northern Labrador Sea. Although scientists have measured ocean temperatures during the region's two warmest months of the year, no one has gauged the water in winter. The scientists hope to attach satellite tags to as many as ten narwhals over the course of a year. The tags have time, depth and temperature recorders that will allow researchers to track whale movements and diving behaviour as well as ocean temperatures in Baffin Bay. Narwhals dive more than a mile below the ocean's surface.

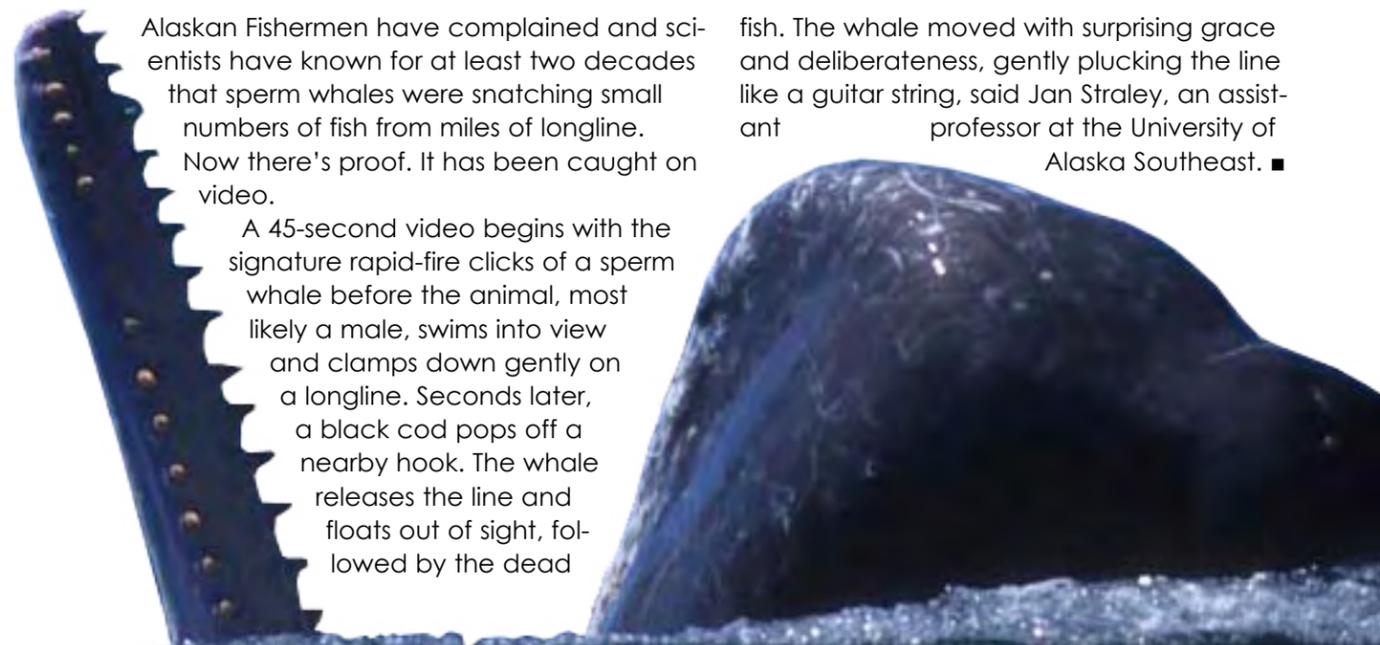
## Sperm whale caught red-flipped

Video footage shows sperm whale pilfering fish from fishing line

Alaskan Fishermen have complained and scientists have known for at least two decades that sperm whales were snatching small numbers of fish from miles of longline. Now there's proof. It has been caught on video.

A 45-second video begins with the signature rapid-fire clicks of a sperm whale before the animal, most likely a male, swims into view and clamps down gently on a longline. Seconds later, a black cod pops off a nearby hook. The whale releases the line and floats out of sight, followed by the dead

fish. The whale moved with surprising grace and deliberateness, gently plucking the line like a guitar string, said Jan Straley, an assistant professor at the University of Alaska Southeast. ■



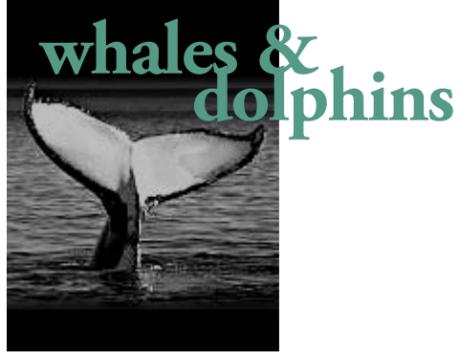
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PETER SYMES



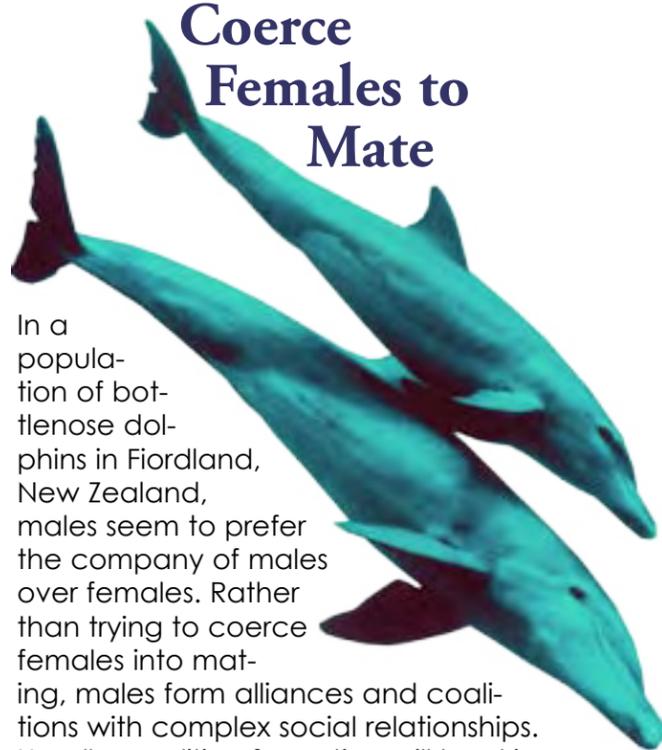
## Some Bottlenose Dolphins Can't

### Coerce Females to Mate

In a population of bottlenose dolphins in Fiordland, New Zealand, males seem to prefer the company of males over females. Rather than trying to coerce females into mating, males form alliances and coalitions with complex social relationships. Usually, coalition formation will be driven by short-term gains for the helper (for example access to females). But there does not appear to be any short-term benefits in coalition and alliance formation in this population. Instead, one male band seems to spend much more time with sexually receptive females and females with new calves than others.

This may explain the complex relationships we observe in male bottlenose dolphins, which are only paralleled by human social strategies: the formation of alliances and alliances of alliances, also called coalitions. These alliances and coalitions are then used to out-compete other male bands to access females. ■

SOURCE: D. LUSSEAU (2007) PLOS ONE 2(4)



## Florida Manatees About to Lose Their 'Endangered' Status

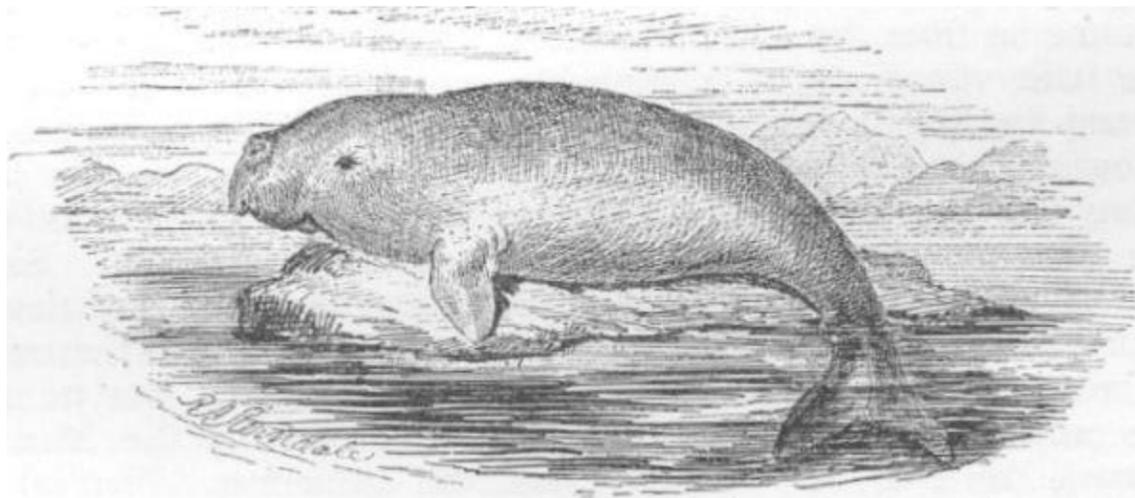
The U.S. Fish and Wildlife Service recommended downlisting the manatee's status from endangered to threatened, a move that indicates the animal has rebounded from the brink of extinction. Following a five-year review of manatee populations in Florida and Puerto Rico, the Fish and Wildlife service has found that the species no longer fits the criteria to be deemed endangered.

Federal endangered status means an animal is at immediate risk of extinction. Threatened status means a species could become endangered in the future if protections are not maintained. The manatee remains protected under the federal Endangered Species Act, making it illegal to harass, poach or kill the animals. in the state.

"Based on the science it is clear that

manatees are no longer facing extinction in all or a significant portion of its range," Dave Hankla, field supervisor for the Fish and Wildlife Service's Jacksonville office, said in a statement. This year's annual manatee census recorded 2,812 animals in Florida. In 1991, the survey's first year, 1,267 manatees were counted. "This is an opportunity for all of our manatee partners to celebrate a conservation success milestone."

Patrick Rose, executive director of the Save the Manatee Club disagrees. He said a classification switch could mean changes in boating and development restrictions that were established to protect manatees. "This is not the time to be moving to say that they're going to be downlisting the manatees and then dilute the protection for them." ■



## Humpback Whales Boast the Longest Mammal Migration

Each winter, humpback whales travel all the way from the Antarctic to the northern tropics to find warm water in which to raise their young. This migration is the longest for any mammal ever recorded. Some researchers claim that the grey whale holds the record for longest mammalian migration—from Mexico to the Arctic—estimated at about 7600 km. However, no individual grey whale has been documented travelling the full extent of their migratory range, and it's possible that no grey whales actually make the entire migration.

On the other hand, one humpback mother and calf have now been recorded to have made a 8300-kilometre trip in 161 days.

Using satellite data, researchers at Cascadia Research Collective in Olympia, Washington, US, also recorded sea-surface temperatures for the sites where humpbacks spent the winter. Wintering areas occur where waters with temperatures between 21°C and 28°C are found. This supports the idea that the long migration saves the whales energy in the end.

But the whales and other migratory creatures are suffering from global warming that puts them in the wrong place at the wrong time. A warmer climate disrupts the biological clocks of migratory species including dolphins and turtles, said Lahcen el Kabiri, deputy head of the U.N.'s Bonn-based Convention on Migratory Species.

Many creatures are mistiming their migrations, or failing to bother as changes between seasons become less clear. The shifts make them vulnerable to heat-waves, droughts or cold snaps. ■



FRITZ GELLER-GRIMM



focus

Text by  
Millis Keegan

# Fins

ALL PRODUCT  
IMAGES AND ACTION  
DIAGRAMS ARE  
COURTESY OF THE  
MANUFACTURERS



Diagram of how the Oceanic Suction Force 2 split fin design forms a directed vortex providing forward thrust

WOLFGANG LEANDER

**Fins provide a great way to get from point A to point B in an H<sub>2</sub>O environment. In fact, with few exceptions, it is the only way to get around with ease while diving.**

The good news is, there are more styles and models to choose from than ever before. By the same token, the bad news is, there are more styles and models to choose from than ever before.

As a diver you are limited by your strength and stamina. This is when the design of the fin really can work for you. If you are an able-bodied, strong person, you will have little problem with whatever fin you happen to wear. A good blade design will merely fine tune your performance. But if you know your stamina is low, and it has been some time since you visited a gym, choosing the right fin can make all the difference between a

bad or good experience. However, it is easy to get confused. Fin designs have evolved over the years. Long fins, short fins, split fins, twisted fins, stiff fins, soft fins...

### How to choose?

We keep telling you to do your research, but looking at specifications in isolation will most likely just add to your confusion. To figure out what the right fit for you is, you need a step-by-step approach that will narrow down the options with a process of elimination.

### Fin Formula

Begin with clarifying which kind of diving you would normally be doing. Also, consider the level of your physical fitness in this context. Then, start looking for a fin. Today, there are choices that respond to different needs. It's a good thing. At the end, the fins need to be comfortable, and they need to perform.

### So, who are you?

Will you be mostly diving in a way where you need to cover long distances and rough water during your dives? Will you be fighting current and waves on a regular basis? Is it more important for you to be able to maneuver with ease under water? Or, are you one of those that just likes to cruise along and enjoy the view?

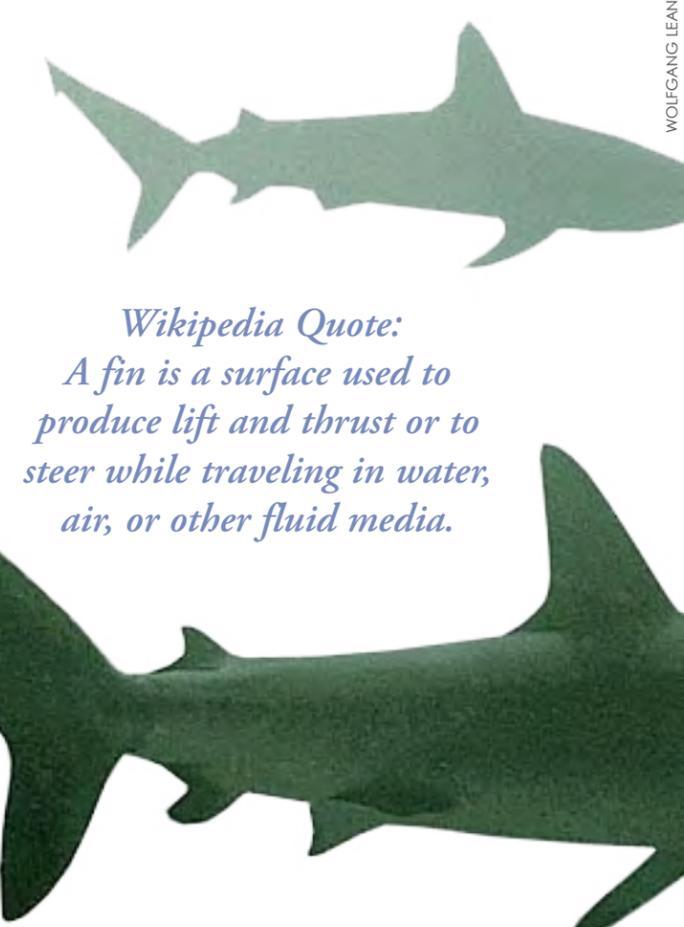


### The Mount Everest Diver

The Mount Everest Diver is a diver looking to move effectively and effortlessly through water,

while covering long distances during his dives. He does not like to take the easy road, the tougher conditions the better. With a compass in hand, he plots the course to the dive site from the shore. Then, he endures the long surface or under water swim to the site with a smile on his face—at least, with the right fins, he does.

You need a good pair of fins that can push water effectively and move you forward without tiring you. You need a large blade with some

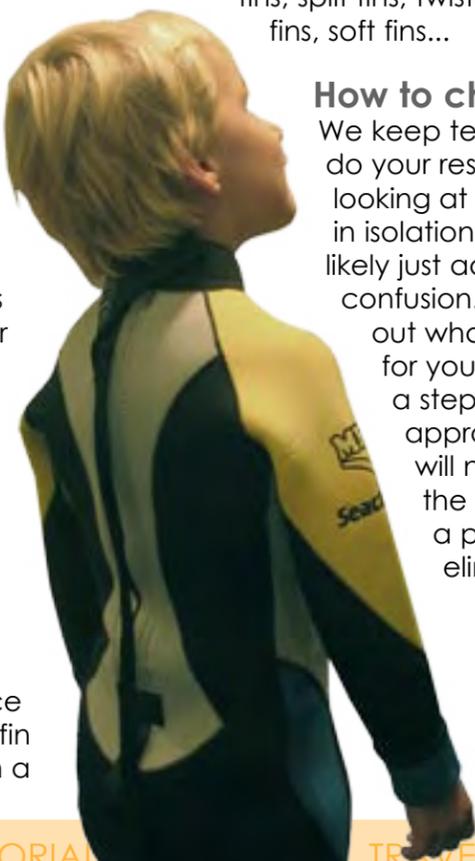
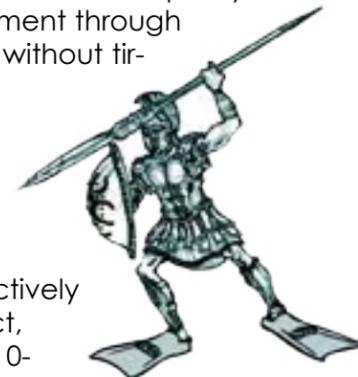


*Wikipedia Quote:  
A fin is a surface used to produce lift and thrust or to steer while traveling in water, air, or other fluid media.*

stiffness built in. How much stiffness depends on how fit you are, but you will need a fin that can transport you and your dive equipment through the water resistance without tiring you.

### The Spear Fisher

The Spear Fish Diver needs maneuverability as well as the option to move effectively through water. In fact, he needs to go from 0-





# focus



60 in a split second in order to land that catch.

## The Ocean Diver

The Ocean Diver is a diver who knows that any second of the dive, the current can pick up. He needs a fin that can fight the current and violent wave action on a regular basis.



## The Cocktail Diver

The Cocktail Diver is a diver that just likes to cruise along and enjoy the view. He is typically found in tropical water, and cares nothing about efficiency and speed. He lives in the moment, knowing that the dive boat will pick him up when he runs out of air or time—whatever comes first.

## The Explorer

The Exploration Diver is a diver on a mission. They can be photographers, wreck and/or cave divers, and the one thing they all have in common is that there is a purpose to their dive. They need full control of every movement during the dive, not to stir up silt or scare the wild life. They have to be able to maneuver with ease. A conscientious tropical diver who needs to move carefully around to protect the reef might fall under this category, too. You need a shorter, more flexible fin than the average, which still has the capacity to move you forward with ease.



## The Snorkeler

The snorkeler hangs mostly on the surface. Occasionally, he takes a plunge to take

Illustration of the split fin principle. The blade opens up, creating both a pushing vortex directed away from the diver and lift on the inside of the blade

a closer look at something, but the main objective of his time in the water is to observe from above.

The snorkeler does not have the advantage of using the fin while immersed. He might favor a more flexible, light weight fin to handle the occasional "air" flip in an effective way.

Gone are the days when the rubber fin ruled the world. And for all you rubber fin fans out there, don't get offended. That is still a good design, but maybe not for everyone.

## The Physics of Fins

When diving, you need a flexible fin of moderate length. When you push down on the fin when kicking, you bend it, and it is largely the spring-back force from the fin as it straightens that propels you forward. This makes the material choice—



and fin shape critical to getting the right spring force for optimal efficiency.

## Fin Types

### Paddle fins

The traditional paddle fin is a really simple design, a flat blade with a mounted foot pocket. The material of the blade is made out of stiff plastic, composite or rubber. The design of the fin generates quite a bit of resistance during the kick cycle and requires rather good leg muscle strength for effective strokes. Because of this, the paddle fins are sometimes considered to be not so efficient.

A more developed paddle fin can come with a water vent through the blade, opening backwards on the underside and forwards on the upper side, blowing a jet of water backwards out of the fin as the fin flexes. Others have convoluted channels and grooves, in an effort to improve efficiency.

In 1985, Mares developed a new feature for water fins called channels. Traditional paddle fins suffered from water "spilling" off of the edge during the down stroke of the diver's kick. This loss of water translated into a loss of thrust,

Mares Quattro with the characteristic rubber strips that makes the fin flare creating the channelling effect



A traditional paddle fin with stiff blade—simple, durable



meaning that the diver's effort was not being fully utilized. Mares' channels worked to maximize fluid stream channeling, keeping the water under the fin in place, so that it can be displaced during the down stroke. This increase in water displacement allowed for greater thrust levels and improved overall performance.

The addition of channels or grooves made the effort and energy expended by the diver more valuable—more thrust was generated with each stroke. But this advance in technology did not solve the energy inefficiency of the kick cycle upstroke.

### Split fins

Split fins are considered one of the most efficient hydro-dynamic fin designs. However, that does not necessarily make it the best overall fin.

In the split fin, as the name indicates, the blade is split, which causes a kind of propeller movement. Using traditional fin kicks causes a suction and creates a lift, which allows the diver to move with less effort compared to using a paddle fin.

Water flowing towards the center of the fin's "paddle" portion also gains increased speed as it focuses, creating a "scooping" or channeling effect.

Split fins are generally regarded as among the most efficient fin designs, although there is



APS Mantaray's Dual Water Channeling System and side wings function as a combined unit to give the fin its ultimate stability and performance



# focus

Force Fin in a nutshell. Made in one piece, blade is split down the middle and with upturned fintips



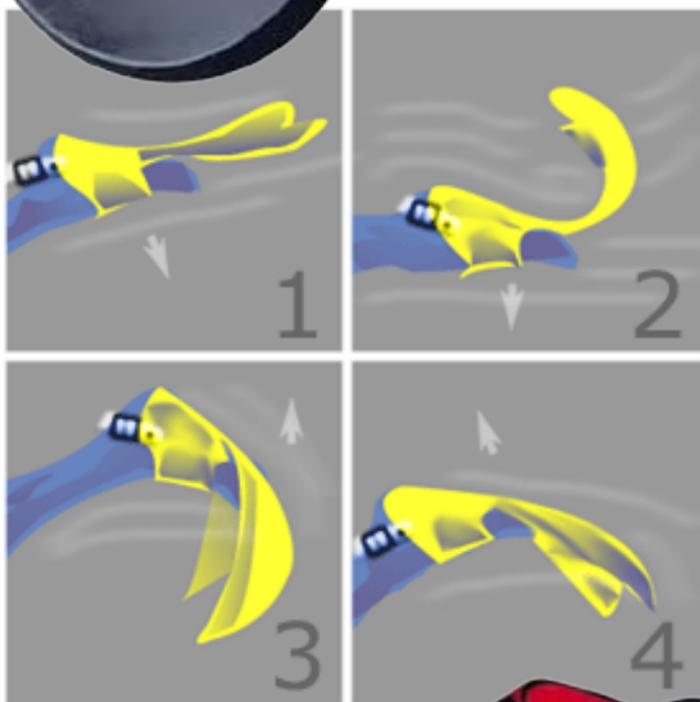
Force Fin swimming fins utilize the body's strength and put it where it's needed. The human body is built to have more strength when kicking down (during freestyle), than when kicking up. The downward, or power, phase of the kick emphasizes the powerful quadriceps muscle group at the front and side of the upper leg. The upward, recovery phase uses the weaker hamstrings at the back of the thigh

ongoing controversy among divers as to their versatility—many report that split fins cannot be used for frog kicks and are poor for maneuverability.

### Force fins

Force fins are in a category of their own. Radically different from all other fins, their now classic model is characterised by having a wide upturned blade made of polyurethane, with a shallow V-shaped cut into the end. Force Fins were the first to mimic the fins seen in nature and also pioneered the split fin.

The fins are characterised by a different swimming sensation and valued among their devoted fans for their high efficiency and acceleration, while others dislike their maneuvering characteristics. However, it



Attaching adjustable whiskers that channel the thrust enable the wearer to change the characteristics of the fin to make it fit the type of dive

is also said that you can back up with Force Fins. Also, for divers who wear neoprene wetsuit boots in colder waters, the negative buoyancy of the lightweight Force Fins is not sufficient to counter the positive buoyancy of their boots, calling for the use of ankle weights.

**Freediving fins** are far longer and are designed to work with slow stiff-legged kicks that conserve energy and oxygen. Though primarily intended for high efficiency at variable depths, they can still deliver



Top-end freediving and snorkelling fins are now made in advanced materials such as layers of carbon fiber and fiberglass

Monofins are made with speed swimming in mind



Karmo Maasik is owner of SpecialFins in Estonia specializing in high quality swimming fins for lifesavers, freedivers, swimmers, underwater rugby players and spearfishers. Twice the world champion in finswimming, Karmo Maasik custom make all their fins according to individual needs and requirements. They are made of carbon, Kevlar, fiberglass and hand-laminated fiberglass, which are vacuum processed in special moulds. SpecialFins mission is to make the world's best fins for sports ans challenge, fun and adventure.

Karmo Maasik writes: "I recommend the following fins for these types of divers: The Mount Everest Diver should use the Freediving Stereofins Carbon. They are very good flexible fins, hand laminated and produced from two layers of

thin carbon and 18 layers of fiberglass.

The Spear Fisher should use the Hybrid Professional made of two layers of hybrid material 50 percent Carbon and 50 percent Kevlar, hand laminated, with more than 20 layers of fiberglass.

The Snorkeler should use the Freediving Stereofins Pro." ■



WWW.SPECIALFINS.COM

**John Melius, President of Morfin Corporation, writes:**

Have you ever wondered how it would feel to be a fish in water and wander effortlessly, or to maneuver with speed through tight areas hardly disturbing the environment? Now you have the opportunity to come closer to this feeling than ever before. What you need to have in order to do this is the same kind of propulsion tools that fish use, which means pelvic and dorsal fins and a tail fin moving like a fish.

Why do they work? As in nature, excellent hydrofoils (wing shapes) generate excellent lift just like airplane wings. But wings only work when there is a flow over them, and so, an airplane needs a propeller (a rotating set of wings generating flow) just like the fish needs a relatively flat body and pelvic and dorsal fins to generate flow. Our fins work exactly that way, unlike paddle and split fins that work by creating a void in the water and being sucked into the void.

*What benefits does this new fin technology bring to every type of diver?*

First, you can make much smaller kicks (like fish) for greater control in tighter environments. Mor-Fins do not need to create a "void" in the water to work (the reason that "scuba kicks" are so large is to work the void longer) and our fins work in each phase of the kick (there is no recovery kick which means that you can swim almost full speed with only one fin). Second, the tail fin gives extra power and speed to your kick with no extra work.

### Why?

Because it generates power simply by being in the right place, as water flows over it the same way that an airplane wing generates power when air flows over it.

Third, these fins cause less silting while generating more directed power where you want it. This comes from the delta wing shape of the tail fin and blade that focus

the flow of water directly in the center of the fin pulling water from the sides of the fin to reduce silting and reduce vortices and drag.

Fourth, the blade and tail fin work in serial amplification of the flow of water to increase lift producing more power with less effort.

Fifth, the fins bend near the ball of your foot to allow more natural movement with less effort while producing more power using a living hinge.

All of these features are patented except for the living hinge that is patent pending. Therefore, these fins benefit you with more power, speed and comfort with more maneuverability using tighter kicks with less effort more efficiently.

### Which one?

The question is not which one of these fins would work best for which type of diver. The question is which one of these divers wouldn't gain from using Morfin's Delfins or VT-300's? For the Mount

*These fins do not have any straight lines anywhere on them, and machines do not like constantly changing curves.*



Everest Diver, no fins appear to be, or are more hydrodynamically shaped, than each type of Mor-Fins (the wing shapes are extremely evident). There are no ribs to create drag, and the efficiency

and ease of use of these fins are remarkable.

The Spear Fisher will accelerate faster and for a longer period using these fins and tight small kicking like the fish that he is tracking. Tighter smaller kicks create less drag using less effort and allowing more of your effort to go towards speed.

The Ocean Diver cannot have a better fin

for handling currents because these fins do not try to create voids in the water to move. The moving water in the current is an asset to fins with wings. Wings use moving water and convert it into badly needed power in a current. The Explorer cannot find fins that have this much power and are smaller. These smaller fins maneuver just by moving your toes without your legs moving at all when necessary, but give highly efficient movement with any type of kicking too.

The Snorkeler will not find fins that are more comfortable and easier to use with speed coming with effort that is less than walking on land. Fish propulsion is fast yet efficient, powerful yet comfortable, and very maneuverable.

*What other qualities could you want for any diver?*

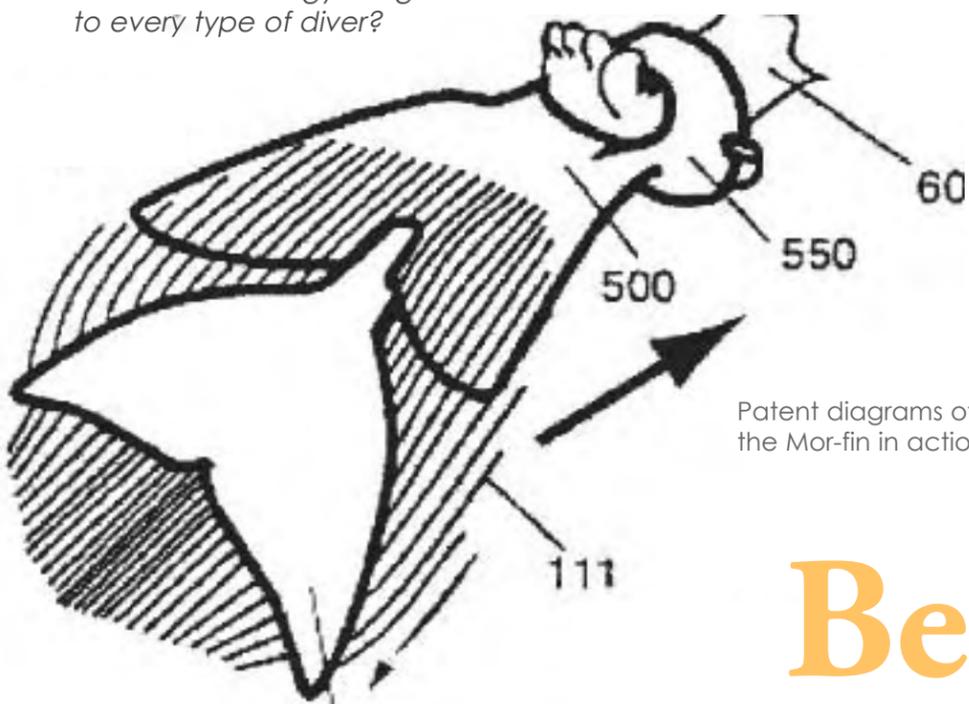
One last question may remain. Why don't you know someone who already uses these fins and loves them? Even though the first patent

was filed about ten years ago on these fins, the road to manufacturing has been difficult because of the hydrodynamic shape of the fins. These fins do not have any straight lines anywhere on them, and machines do not like constantly changing curves. So, the road to quality manufacturing has been a slow, but steady one leading us to today.

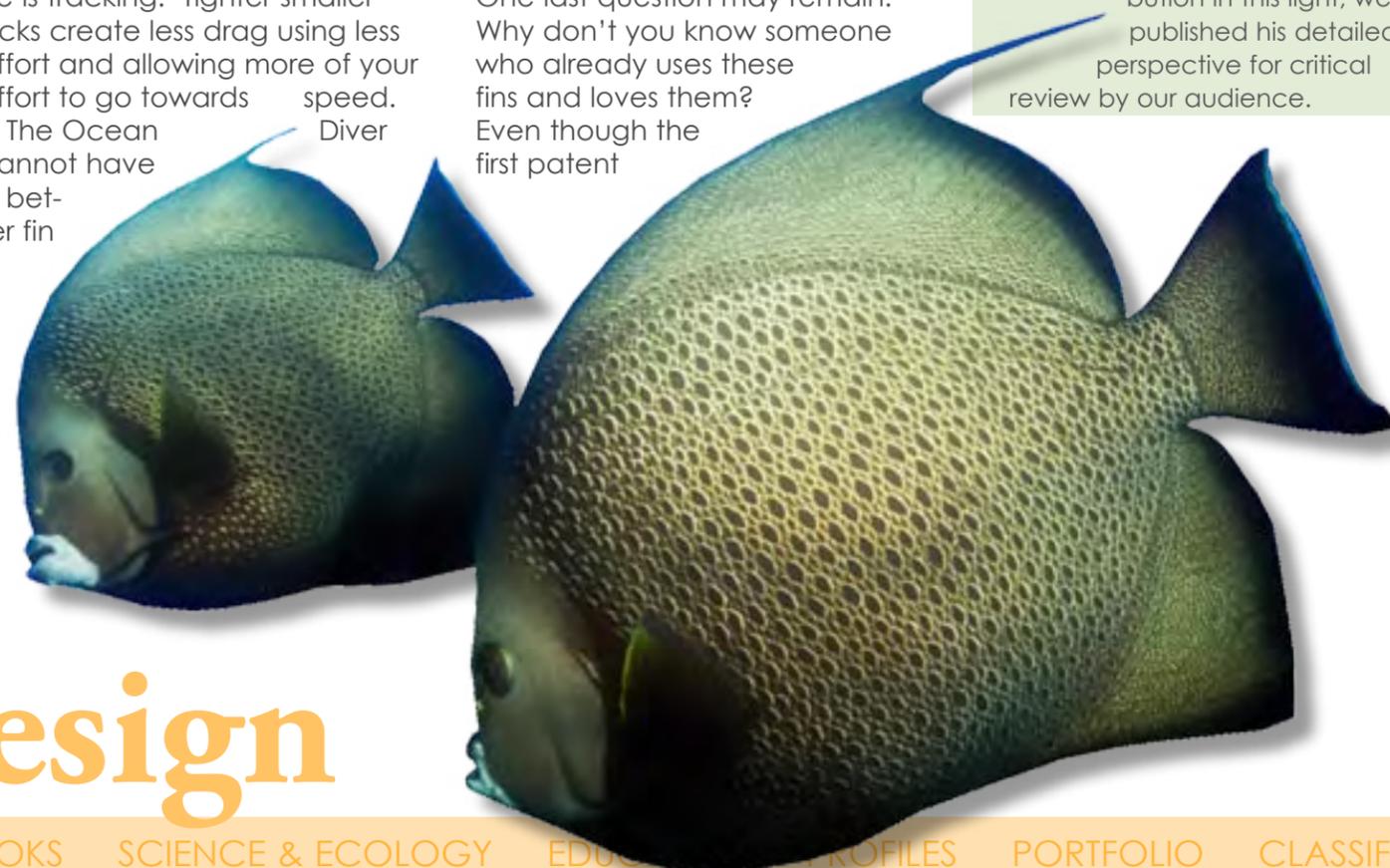
They are available now, and will be available soon in six sizes for open heeled fins. So, if you are curious to experience how fish swim instead of swimming like frogs (paddle and split fins), check out our web site, [www.mor-fin.com](http://www.mor-fin.com) for a no risk purchase to experience swimming with the only winged fins, Mor-Fins. ■

### EDITOR'S COMMENT:

Publishing Mr Morfin's letter took a bit of deliberation, since as president of a fin-manufacturing company, Mr. Melius obviously has a vested interest in the subject and promoting his fins. However, as we would like to credit our readership with being able to view his contribution in this light, we published his detailed perspective for critical review by our audience.



Patent diagrams of the Mor-fin in action



# Behind a design



# Fin Care



Rinse with fresh water after a dive

## Do's & Don'ts

Store your fins properly, and they will last a long, long time. Save the inserts, that helps keep the shape. They should be rinsed with fresh water after a dive, and dried before stored away, with the inserts. This is particularly important for a full foot fin.

- Store in a cool and dry place. Do not store in direct sun light.
- Do not store them standing on their blades for any long period of time. Hang them up if possible.
- Avoid leaving the fins in a car trunk or in direct sunlight for a long period of time on a hot summer day. The heat deforms the blade, which can seriously affect the performance of the fins.
- Also, avoid contact with chemicals. Exposure means that rubber and plastic materials can degrade, and that goes for pretty much all of your dive equipment. Even storing your equipment near chemicals, gasoline and solvents can cause problems.



Leave out of sun, avoid chemicals

## Use

To avoid stress on a full foot fin, wet the pocket, fold over the back of the fin, insert your foot and flip up the back part.

To avoid stress on a heel strap fin, use your buckle. Loosen the strap, buckle up, pull to fit. That way you reduce the stress on your buckle, which will most certainly not like you if you keep stretching and pulling your strap when putting your fin on. However, if you are one of those who like the speed and convenience of the pull the strap-method, always, always keep a couple of spare straps at hand.

## Buckle up, buckle down, buckle shut, buckle tight

There are a number of different solutions to keep your foot in your fin, and the buckle and/or strap should also be considered when shopping for a fin. All you warm water divers out there, you probably have no idea why we are even addressing this, unless you have some physical problems that makes it tougher for you to handle yourself before and during a dive. But for us cold water divers, a dry suit and dry gloves can really put a damper on our graceful appearance in the water. Before we spend money on a good quality fin, we should take care to look for a fin we can put on and adjust with ease, and at least bring your dry suit gloves with you while you do your shopping.

*Always keep one complete strap as a spare*



Metal springs are more durable, and flexible

Metal springs with finger strap

Simple rubber strap for buckles

reinforced with slats of steel

The commonplace buckle and strap set allow for easy adjustments of strap tightness

## A variety of fin straps

You have heard it before, and we all know it, yet I have enough dives under my belt to know that we don't always follow our own advice, and this one is worth being a nag about: Be prepared, always keep one complete strap as a spare, including both locking buckle ends. ■

**Special thanks** to the following participating fin manufacturers for their help with the fin feature article:

APS Mantaray  
[www.apsmantaray.com](http://www.apsmantaray.com)

Beuchat  
[www.beuchat.fr](http://www.beuchat.fr)

Mares  
[www.mares.com](http://www.mares.com)

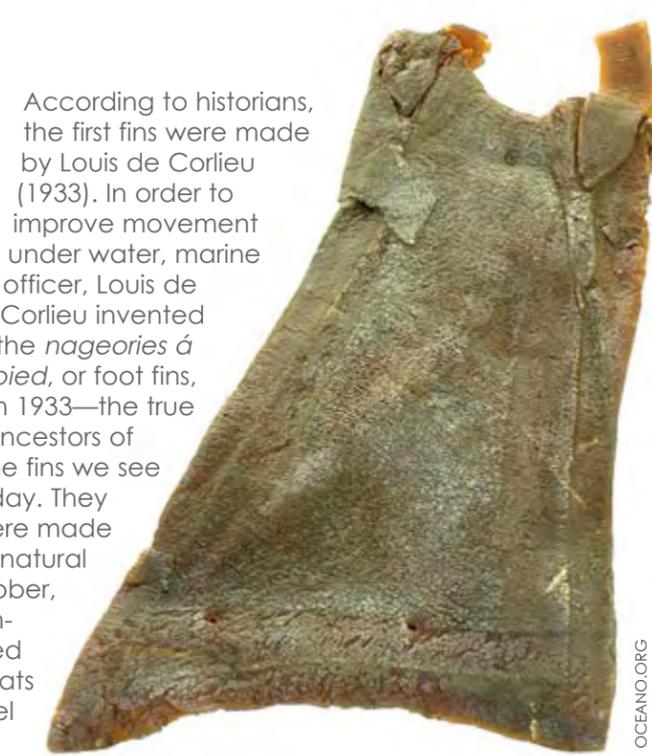
Mor-fin  
[www.mor-fin.com](http://www.mor-fin.com)

Seemann Sub  
[www.seemannsub.de](http://www.seemannsub.de)

Elastic bands for securing fins with footpockets



Mares' ABS buckle is hinged and can be flipped open even with gloves on



According to historians, the first fins were made by Louis de Corlieu (1933). In order to improve movement under water, marine officer, Louis de Corlieu invented the *nageoires à pied*, or foot fins, in 1933—the true ancestors of the fins we see today. They were made of natural rubber, reinforced with slats of steel

With Aqualung's HF (Hands Free) Buckle, you just step on the red bottom to release the strap

For bare feet or boots? If you dive in cold water you'll need the boots. You can use these in warm water too



OCEANO.ORG

# profile

Interview and photos:  
Peter Symes  
Supplementary product  
photos and historical  
images courtesy  
of Force Fin



Jean-Michel Cousteau tries out the Force Fin Design that Bob Evans designed for his team

to think of inspiration as floating in the universe like seeds. Ideas are out there just looking for a fertile mind in which to grow. Take our new OPS fin that we are making for Jean-Michel Cousteau's Ocean Futures Dive Team. I conceived of this fin watching water wick to the end of a leaf of a tropical plant. The concept is before us everytime it rains.

**What influence did your friends and family and your upbringing have on the choices you made in life?**

I can credit my family for everything

**Our talks with Bob Evans were just full of good ole plain fun, with lots of laughs and entertaining anecdotes, yet serious and focused on the subject. From the first impression, he was open, welcoming and very conversational. Inventor of the legendary Force Fin, multiple**

**award-winner and industry legend with a long list of merits to his credit Bob Evans is obviously both multi-facetted and multi-talented and impossible to fit into any of the usual stereotypes boxes. Here are some of his thoughts on the connection between shape and function.**

**When were you first attracted to the ocean?**

My great-grandmother had a summer house in Hermosa Beach, California. My grandmother taught me to swim in the sand troughs that remain full of water at low tide. I grew up in Hermosa Beach, California, home for California surfing and diving industries. The Ocean has always been there for me.

**What sparked your interest in diving?**

When I was a child, my family and I were having lunch on a breakwater in Marseilles. A truck pulled down the jetty, and a couple of guys in wetsuits with steel tanks on their backs jumped out of

the truck and into the water. They reappeared about 20 minutes later dragging a box between them. As they passed, my father told us all not to look at them. It was there and then, I decided I was going to be a scuba diver.

**What inspires you, and how do you get your ideas?**

Dr Phil Nuytten (see interview with Phil Nuytten in X-RAY MAG issue #9) calls me "Bob by God". I like



## A conversation with Bob Evans

# Splitting Fins



# profile

Force Fin Extra with the characteristic whiskers



*If you feel a fin, then it is working against the water. If you move or better yet, feel like you are effortlessly flying, but you feel no fin, then it is a good, maybe even great design.*



*Force Fins are shaped by hand  
We do not use computers.*

Force Fin also supplies the military

## How do you sense or judge that a design is right?

By its lack of sensation. Earth is all water. Everything in nature is designed by and for the movement of water. Water always takes the path of least resistance. If you feel a fin, then it is working against the water. If you move or better yet, feel like you are effortlessly flying, but you feel no fin, then it is a good, maybe even great design.

and Excellerating Force Fins are longer and flatter than the Original models, so we enhance their effectiveness by adding winglets, Bat Wings, Whiskers, Speed Pods or Sharks' Teeth. These shapes are designed to increase the speed and volume of water travelling over a longer and flatter fin blade.

An early study of vortex generators

I have ever done. After Marseilles, my parents gave me a surf mat with a clear window that allowed me to look down into the clear waters of the Mediterranean and see all of the fish and creatures below. I became obsessed with the ocean at this early age. A cousin taught me to free dive. My father is an artist. He taught me to sculpt. Force Fins are shaped by hand; we do not use computers.

## Explain what you perceive as the connection between shape and function?

Fins are a perfect example of the importance of this relationship. Engineers make other fins in a computer. They are all flat and their function is best understood 2-dimensionally—pushing and pulling the fin blade against the water. As I said, I sculpt the

Force Fin shapes. There is a volume of water behind you, above and below, all waiting to be activated by the movement of your fins. The shape of Force Fin, its leading edges at the side of the foot pocket, its smoothness and curves, its structure combined with its flexibility, all work to draw the total volume of water over and under the blade, and the reaction of the water to the motion of the blade all work to accelerate the water through the V-split, no matter what position you move your leg. Our Extra

Having fun making customized fit for Jean-Michel Cousteau



**What do various shapes mean to the performance of a fin?**

Everything. For example, holes in fins inhibit water flow. They create more work. We're terra creatures and our frame of reference for moving is resistance against the soles of our feet. That makes us comfortable with fins that offer that resistance. But for water to move quickly, it must be free. Shapes that are designed to freely move water from the front of the blade to the rear will give better performance than shapes that are designed to capture water.

**How does one select which fin is appropriate for him or her?**

We have found that the most important factor for fin performance is how it fits the personality of the diver. That is why we make so many models of Force Fin. All fins marketed today work. I believe that ours work better and our company is exclusive in its ability to explain how and why they work better, but the fact is that the fin must fit the diver's personality for it to work best for them. First, it must comfortably fit

Bob Evans engaging X-RAY MAG editors Andrey Bizuykin and Millis Keegan in debate

the foot of the diver. It must also fit their application. A soft flexible fin will be most efficient for a diver who is under light loads—diving for recreation in warm waters. A flexible fin may work in more demanding conditions, but it will have a fall-off in efficiency if the diver is carrying heavy loads, diving with doubles, wearing a drysuit, and if their kick is very strong. In this case, the fin must give more power, which we prefer to call leverage under load, and a stiffer fin is more suitable.

**What do you consider your best idea?**

I will not argue with experts. Our Tan Delta Force Fin, which is based upon the Original Force Fin design is in the New York Museum of Modern Art for changing the way in which we perceive moving through water. That is a very tough act to follow. I am excited about our new Launch Pad line of fins. They have a foot pocket to which you can attach many different fin blades, but with a new twist. At the point where they attach there is an interlocking gear surface, so you can easily turn the blade to change its relationship to your foot and the water. It can become stiffer or more flexible. You can change its pitch or orientation simply by turning it at its point of attachment. This can be done before you enter the water or when you are underwater and underway. It's the next generation of our Force Wings, Bat Wings, Whiskers, Speed Pods, Sharks' Teeth and their like.

Tinkering in the wizard's workshop



*I can credit my family for everything I have ever done*

*"...to help people move through the water as freely as the marine inhabitants that inspire our fin designs."*





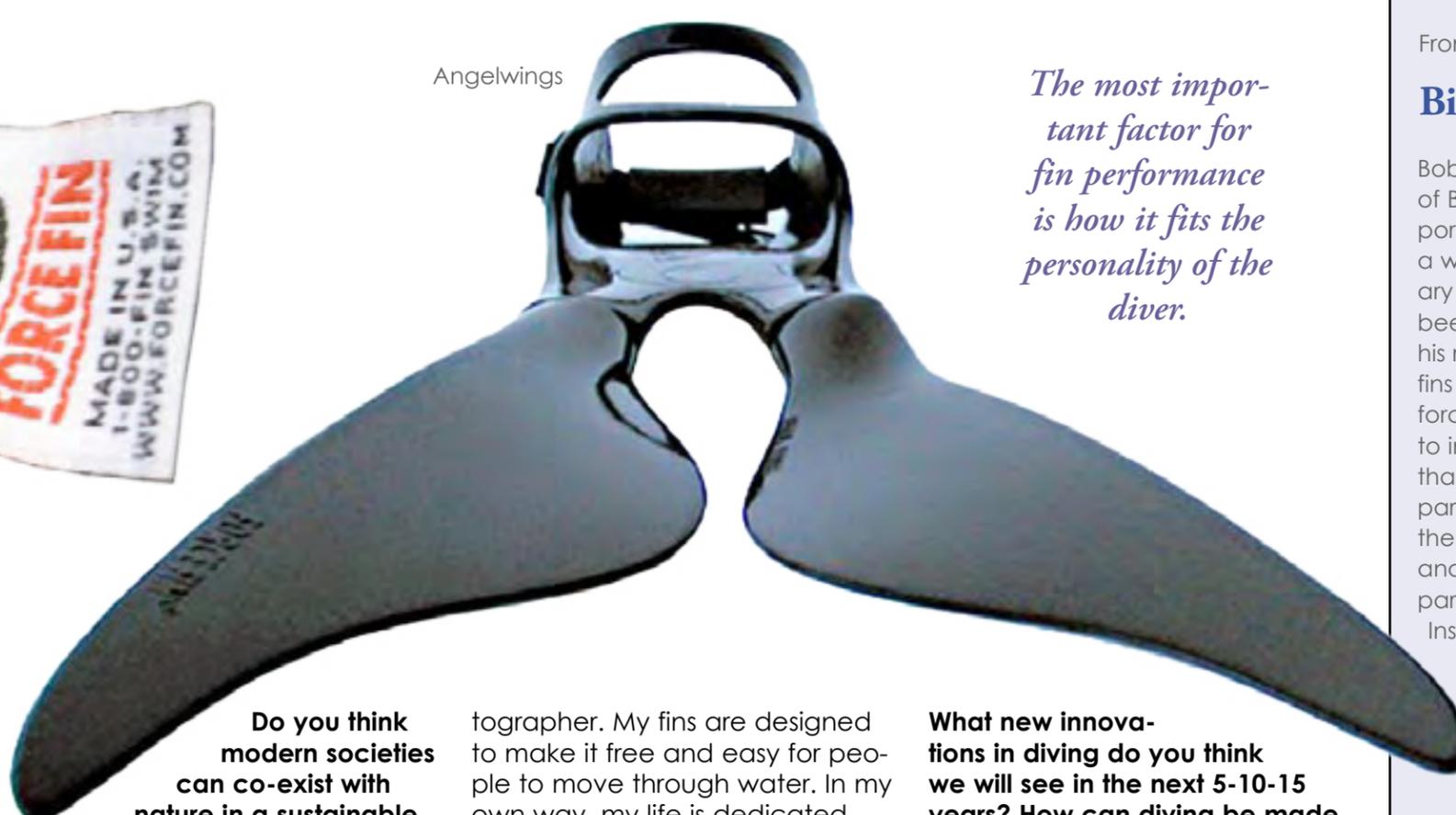
**Who do you admire the most, or do you have a role model?**

I have many role models: My parents, JFK, Johnny Weismueller, Will Rogers, Bev Morgan, Lad Handleman, Bob and Bill Meistrell, Stan Waterman, Jacques Cousteau, Jean Michel Cousteau, Hans Haas and Malcolm X.

**What can we learn from nature?**

Everything.

Inspiration comes from many sources. Malcolm X was a prominent black nationalist and charismatic human rights activist in the U.S. in the 1960's



Angelwings

*The most important factor for fin performance is how it fits the personality of the diver.*

**Do you think modern societies can co-exist with nature in a sustainable manner i.e. through implementation of new laws, conventions and new technology?**

We're at a very difficult time. There are many of us who acknowledge that this is imperative, but there are so many conflicting forces polarized in their positions. Technology or laws will not achieve the necessary change. A change in global consciousness is required. The majority of the world perceives the water as cold and dark, with inhabitants that are alien at best. They are more frequently understood as monsters. The funny thing is that everything is water, and we are the ones that are in an alien environment when immersed.

The mission statement of our company is "to help people move through the water as freely as the marine inhabitants that

*One diver can make a difference*

inspire our fin designs." I began my career as an underwater pho-

tographer. My fins are designed to make it free and easy for people to move through water. In my own way, my life is dedicated to educating the public that the underwater environment is a place of beauty and freedom. When we raise the collective consciousness to understand the oceans in this way, that will result in the change necessary to our own survival.

**What role do you think recreational diving can play in raising the public's awareness in the future?**

Divers sharing their underwater experiences is part of the educational process necessary to raise global consciousness. Our current administration has one of the worst environmental records in history. A private showing to the President and his staff of a "Voyage to Kure", the first of the new television series by Jean Michel Cousteau and his Ocean Futures Dive Team, catalyzed the President into designating the Northern Hawaiian Islands as the world's largest marine preserve. It is true. One diver can make a difference.

**What new innovations in diving do you think we will see in the next 5-10-15 years? How can diving be made easier and safer?**

Masks. They are due for an update. Methods of carrying less weight.

**Do you consider doing other types of dive equipment but fins?**

Yes. I have a great mask design, but I think my energy is best spent applying what I have learned to making ships more efficient. I also have some great ideas on how to make underwater current generators better.

**What legacy would you like to leave behind?**

Creativity is a gift we all have. To learn how to tap into it you must push forward with positive solutions in response to the negative.

**What's next for Bob Evans?**

Efficient ships and clean energy. ■

From Academy of Underwater Arts and Sciences:

## Biography

Bob Evans is Founder and President of Bob Evans Designs, Inc., the corporate entity behind Force Fin. He is a world class photographer, visionary and noted inventor who has been awarded over 33 patents for his revolutionary fin designs, including fins that use lift as opposed to drag forces to propel a diver, fins that snap to increase diver efficiency and fins that are split. His Tan Delta Force Fin is part of the permanent collections of the New York Museum of Modern Art and along with his Extra Force Fin, is part of the collections of the Costume Institute of the New York Metropolitan Museum of Art.

Bob has devoted his life to sharing the oceans. His company's mission statement reflects his vision to help people feel as free as those who inhabit it. His diving career began in 1964 when he learned to free dive and purchased his first Nikonos. From 1966-73, he was employed by Dive 'N Surf in Redondo Beach, California, and was certified by Bob Meistrell, County of Los Angeles Instructor No. 1. In 1967, he was trained as a commercial diver and over the years, he has made over 850 dives documenting life below platforms in Santa Barbara Channel under contracts with Exxon, Shell Oil Company, Atlantic Richfield, Union Oil, Western Oil & Gas and the American Petroleum Institute. As a photographer he is best known for his Channel Islands Collection, which includes images he took on and in the waters surrounding the California Channel Islands.

Bob Evans is an original SSI Platinum Pro 5000. He was awarded

an Honorary Masters of Science by the Trustees of his alma mater, Brooks Institute of Photography for extraordinary contributions to art, science and photography.

Evans' photography has appeared in over 300 publications including Time, Life and National Geographic. He has published two books, *The Living World of the Reef* and *The Channel Islands Collection*.

Bob Evans has designed underwater camera housings for time-lapse systems, camera towing systems and a buoy system to carry cameras to preset depths. He was Chief Photographer of the SCCWRPP's study of artificial reefs managed by Willard Bascom and John Isaacs of Scripps Institute of Oceanography. Atlantic Richfield Foundation funded Evans' productions for the Cabrillo Marine Museum.

Santa Barbara's Sea Center opened with an exhibit of his photographic work. In the 1980's, Evans received a research grant from Kennedy Foundation to study the feasibility of harvesting and canning mussels from the offshore oil platforms of the Santa Barbara Channel. Bob Evans is best-known for his fin designs, the most popular of which is his Force Fin, which he patented in 1981. His day job is serving as President of Bob Evans Designs, Inc., a research and development company that also manufactures and distributes Evans' fins. ■

