Soundings

American Cetacean Society – Monterey Bay Chapter
PO Box H E, Pacific Grove, CA 93950

MONTHLY MEETING AT HOPKINS MARINE STATION, LECTURE HALL BOAT WORKS BUILDING (ACROSS FROM THE AMERICAN TIN CANNERY OUTLET STORES)
MEETING IS OPEN TO THE PUBLIC

Meeting Date: Thursday, February 26, 2015
Time: 7:30 PM

PLEASE JOIN US AT 7:00 FOR REFRESHMENTS

Speaker: **Dr. Geoff Shester**
California Program Director, Oceana

Topic: "Reducing Bycatch of Cetaceans in One of the Nation's Dirtiest Fisheries"

Drowning marine mammals and turtles snagged in gillnets – a challenge nagging ocean conservationists – is part of our February program as Dr. Geoff Shester tells us about the California swordfish industry and its drift gillnets. It is now considered one of the "dirtiest" bycatch fisheries in the nation.

Dr. Shester studied ways to reduce bycatch in nearshore gillnet fisheries while working out of Hopkins Marine Station, earning his doctorate from Stanford's Interdisciplinary Program in Environment and Resources. Now Oceana's California Campaign Director, he's working on ways to reduce bycatch in gillnet and trawl industries, as well as protecting forage species in the California Current ecosystem, and restoring endangered Pacific sea turtle and shark populations.

Oceana has proposed transitioning away from drift gillnets completely with alternate fishing methods, such as legal harpoon gear.

Geoff graduated from UCSC with a double major in biology and environmental studies before joining Oceana in Alaska. He remained an Oceana consultant while working on his doctorate, then joined the Monterey Bay Aquarium staff as senior science manager of the Seafood Watch Program. After a few years, he returned to Oceana and works out of the Monterey office.

Please join us for refreshments before the program begins. More information is available on our website, www.acsmb.org.

Next month: On March 26, our speaker will be UCSC scientist Marc Mangel, whose testimony to the U.N. helped get the Japanese whaling program in Antarctic ruled illegal.

INSIDE THIS ISSUE

Short-beaked common dolphin killed in drift gillnet.

CALENDAR

Feb. 15: Science Sunday at the Seymour Marine Discovery Center in Santa Cruz. At 1pm, Patrick W. Robinson, UCSC Lecturer and Director of Ano Nuevo State Reserve presents: "Elephant Seals, Technology, and the Quest to Protect Elusive Marine Mammals on the High Seas"

Feb. 18-21: Pacific Seabird Group 42nd Annual Meeting: A Future for Seabirds. The meeting will take place in San Jose, CA at the San Jose Airport Garden Hotel. For more information please go to pacificseabirdgroup.org.

Feb. 25: Friends of Hopkins lecture by Brendan Kelly: "Snails, Seals, and Scientists." Talk at 7:30 pm at Hopkins Boat Works Hall, followed by panel discussion. Event is free, but registration is required. Please call 831-655-6200 to reserve a seat.

Feb. 27-Mar. 1: 12th Annual San Francisco International Ocean Film Festival at the Cowell Theatre, Fort Mason Center, San Francisco. For more information please go to oceanfilmfest.org.

Mar. 19: MLML Seminar by Dr. James Estes titled "Sea Otters and Kelp Forest: Questions, Approaches, and Perspectives." 4pm in the Moss Landing Seminar Room.

Apr. 9: MLML Seminar by Dr. Scott Schaffer titled "A New Form of Biotechnology: Novel Data Logging Devices Reveal Secrets About the Lives of Marine Animals." 4pm in the Moss Landing Seminar Room.

Mar. 21: ACS/LA Ultimate Whale Watch. This all-day adventure will depart from San Pedro and head toward Catalina Island to look for cetaceans, pinnipeds, seabirds and other marine life. For reservations and more info. go to acsla.org.

BOOK RECOMMENDATIONS

Marine Historical Ecology in Conservation: Applying the Past to Manage the Future, by J.N. Kittinger, L. McClenachan, K.B. Gedan, and L.K. Blight, with a foreword by Daniel Pauly. 2014 University of California Press.

California's Channel Islands: A History, by Frederic Caire Chiles. 2015 University of Oklahoma Press.

BALEEN WHALES HEAR THROUGH THEIR BONES

Jan. 29, 2015 — Understanding how baleen whales hear has posed a great mystery to marine mammal researchers. New research by San Diego State University biologist Ted W. Cranford and University of California, San Diego engineer Petr Krysl reveals that the skulls of at least some baleen whales, specifically fin whales in their study, have acoustic properties that capture the energy of low frequencies and direct it to their ear bones.

Baleen whales, also known as mysticetes, are the largest animals on earth, and include blue whales, minke whales, right whales, gray whales and fin whales. These whales can emit extremely low frequency vocalizations that travel extraordinary distances underwater. The wavelengths of these calls can be longer than the bodies of the whales themselves.

All of these whales are considered endangered, with the exception of the gray whale, which recently was removed from the endangered species list, Cranford said.

Over the past few years, government regulators have been attempting to enact laws placing limits on the amount of human-made noise that baleen whales can be exposed to. These human-made noises come primarily from three sources: commercial shipping, energy exploration, and military exercises.

According to Cranford, baleen whales might be particularly susceptible to negative effects from these sounds. Many of them produce vocalizations in the same frequency range as human-made noises, and too

The fin whale skull used for this study now resides in SDSU's Museum of Biodiversity. (Credit: SDSU).

much human-made noise could limit the distance over which the whales are able to communicate about things like food and mates. Because low frequency sounds travel so far in the ocean, groups of whales that appear to be extremely far apart might indeed be within "hollerin' distance," as Cranford puts it.

However, little information was available about how baleen whales actually hear for government regulators to base new legislation on. Most of what scientists know about how whales hear comes from inferring their frequency range from their own vocalizations, as well as anatomic studies of the ears and some sound playback experiments with whales in controlled environments. Cranford and Krysl wanted to take a different approach: build a highly complex three-dimensional computer model of a baleen whale head--including the skin, skull, eyes, ears, tongue, brain, muscles, and jaws--and then simulate how sound would travel through it.

In 2003, they got their opportunity when a young fin whale beached on Sunset Beach in Orange County, California. Despite intensive efforts to save the whale, it died. Cranford and Krysl were able to obtain the animal's head for their research, placing it in an X-ray CT scanner originally designed for rocket motors.

Once they had their scan, the researchers employed a technique known as finite element modeling that breaks up data representing the skull and other parts of the head into millions of tiny elements and tracks their relationships with one another.

It's a bit like dividing the whale's head into a series of LEGO bricks, Cranford explained, where the properties of the bone, muscle, and other materials determine how strong the connections are between the bricks. By simulating a sound wave passing through their computerized skull, they could see how each miniscule component of bone vibrates in response.

"At that point, computationally, it's just a simple physics problem," Cranford explained. "But it's one that needs lots and lots of computational power. It can swamp most computers."

There are two ways sound can reach a whale's tympanoperiotic complex (TPC), an "interlocking bony puzzle" of ear bones that is rigidly attached to the skull. One way is for the sound's pressure waves to travel through the whale's soft tissue to their TPC, but this becomes ineffective once sound waves are longer than the whale's body, Cranford said.

The second way is for sounds to vibrate along the skull, a process known as bone conduction. Unlike pressure waves passing through soft tissue, longer waves lengths are amplified as they vibrate the skull.

When Cranford and Krysl modeled various wavelengths traveling through their computerized skull, they found that bone conduction was approximately four times more sensitive to low frequency sounds than the pressure mechanism. Importantly, their model predicts that for the lowest frequencies used by fin whales, 10 Hz -- 130 Hz, bone conduction is up to 10 times more sensitive.

"Bone conduction is likely the predominant mechanism for hearing in fin whales and other baleen whales," Cranford said. "This is, in my opinion, a grand discovery."

Krysl added that we humans experience a version of this phenomenon, too.

"We have that experience when we submerge entirely in a pool," he said. "Our ears are useless, but we still hear something because our head shakes under the pushing and pulling of the sound waves carried by the water."

The researchers published their results today in the journal *PLOS ONE*. The fin whale skull used for their experiment now resides in SDSU's Museum of Biodiversity.

It's possible these new findings will help legislators decide on limits to oceanic human-made noise, but Cranford stressed that what's most important about their project is that they managed to solve a long-standing mystery about a highly inaccessible animal.

"What our contribution does is give us a window into how the world's largest animals hear, by an odd mechanism no less," he said. "This research has driven home one beautiful principle: Anatomic structure is no accident. It is functional, and often beautifully designed in unanticipated ways."

Cranford and Krysl have studied many species of toothed whales and beaked whales over the past 13 years, as well as dolphins and fish. Their next step is to try to replicate the study for other species of baleen whales. The researchers will be reaching out to museums that house whale skulls.

"There is a blueprint for multiple species and it is useful to compare across species to gain insight," Krysl explained.

http://www.sciencedaily.com/releases/2015/01/150129143032.htm

---

The Bowhead Whale Lives Over 200 Years: Can Its Genes Tell Us Why?

Jan. 5, 2015 — A whale that can live over 200 years with little evidence of age-related disease may provide untapped insights into how to live a long and healthy life. In the January 6 issue of the Cell Press

journal *Cell Reports*, researchers present the complete bowhead whale genome and identify key differences compared to other mammals.

This is a bowhead whale underwater. (Credit: Loke Film and Adam Schmedes/Cell Reports 2015)

Alterations in bowhead genes related to cell division, DNA repair, cancer, and aging may have helped increase its longevity and cancer resistance.

"Our understanding of species' differences in longevity is very poor, and thus our findings provide novel candidate genes for future studies," says senior author Dr. João Pedro de Magalhães, of the University of Liverpool, in the UK. "My view is that species evolved different 'tricks' to have a longer lifespan, and by discovering the 'tricks' used by the bowhead we may be able to apply those findings to humans in order to fight age-related diseases." Also, large whales with over 1000 times more cells than humans do not seem to have an increased risk of cancer, suggesting the existence of natural mechanisms that can suppress cancer more effectively than those of other animals.

Dr. Magalhães and his team would next like to breed mice that will express various bowhead genes, with the hopes of determining the importance of different genes for longevity and resistance to diseases.

They also note that because the bowhead's genome is the first among large whales to be sequenced, the new information may help reveal physiological adaptations related to size. For example, whale cells have a much lower metabolic rate than those of smaller mammals, and the researchers found changes in one specific gene involved in thermoregulation (UCP1) that may be related to metabolic differences in whale cells.

http://www.sciencedaily.com/releases/2015/01/150105101421.htm

March for Orcas: Free a Whale From Solitary Confinement

By Brenda Peterson

Jan. 15, 2015 — As children we once sat transfixed by the Sea World theatrics of a gigantic black and white orca whale leaping out of a tiny tank and with a mighty tail fluke splashing us with water. As adults we now sit in dark theaters watching the disturbing film*Blackfish*." We witness an orca, Tilikum -- after years of inhumane captivity -- finally stop performing mind-destroying tricks and kill a trainer.

As children we believed the world existed for our entertainment; as adults we understand that we have both power and responsibility for other animals. We can change their worlds and our cruelty.

This Saturday there are worldwide marches for the wild-born Lolita, the orca who has spent 44 years in captivity in a Miami Seaquarium, performing three shows a day for us -- as if we have not grown up. On Facebook and Twitter the word is spreading that it is time finally to set free, rehabilitate, and return to the wild this longest living captive whale. Her pod and the world await her. Lolita's mother and her cousins still swim free in Washington's Puget Sound waters with the J, K, and L pods, of the Southern Resident orca clans. Can you imagine the family reunion when Lolita is returned to them?

Whales belong in the wild. The largest of dolphins, orcas, have lifespans that rival humans. The oldest orca, matriarch Granny of J pod, is 103 years old and continues to lead her J Pod in travels as far as 50 kilometers a day. Orca brains are over four times larger than our brains. Scientists have well documented their complex culture of communication, cooperative hunting, and peaceful, matrilineal societies. Orcas stay with their family pods for life.

As dolphin expert and reformed trainer, Ric O'Barry says, "Orcas are the most social animal on Planet Earth. When they get together they get together -- *for life*."

In our immaturity and lack of knowledge about orcas, we didn't know that orcas had families or lived to be 100. We nicknamed them "killer whales" because transient orcas prey upon other marine mammals. Our Pacific Northwest orca pods survive only on Chinook salmon, a dwindling food source because of our hydroelectric dams.

The U.S. Navy once used orcas for target practice and still harms and harassas orcas by testing their lethal military sonar, even in a Washington State marine sanctuary. And in 1970, when Lolita was only 4-years-old, her L pod of matriarch, cousins, and

calves was brutally rounded up in Penn Cove, Washington in what remains one of the cruelest captures ever recorded.

"It was a terror operation," says Ken Balcomb, of the Center for Whale Research, who has deeply studied these Southern Resident Pods for decades. "The orca hunters threw bombs into the water, herded them with every kind of speedboat and aircraft. They could not escape."

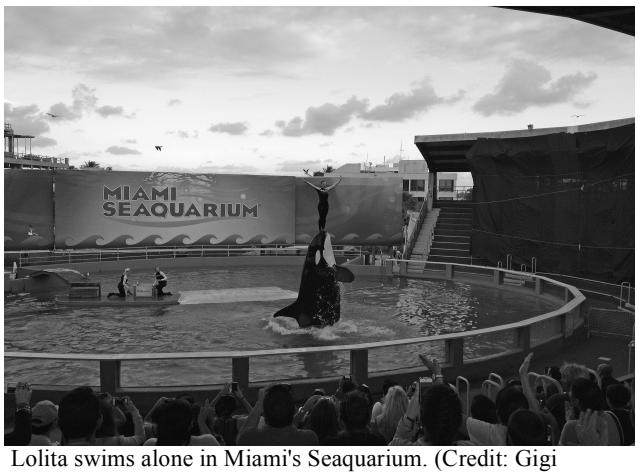
The orca families screamed so loudly their vocalizations could be heard in surrounding neighborhoods. Traumatized orca mothers were violently separated from their calves, including Lolita. Trying to protect the pod, four young orcas charged the nets. They died in their vain attempt at rescue.

One of the orca hunters was so shattered by what he witnessed and took part in, that he began weeping." Afterwards, he decided to take responsibility by testifying before Congress about this capture. This act of accountability led to the Marine Mammal Protection Act of 1972, outlawing any more captures in American waters.

Lolita, the calf who was kidnapped from her family pod still swims alone in Miami, in the smallest tank for any marine mammal. The tank is only 80 ft. by 35 ft., in clear violation of the Animal Welfare Act. This tank is so shallow she can't stand up in its waters. Here in this cement prison for the past 44 years, Lolita is deprived of family, social bonding with her own kind, and any semblance of a normal life.

"You wouldn't treat your own dog this way," says marine mammal biologist, Dr. Ingrid Visser, whose You Tube video shows Lolita's life as it really is. Solitary Confinement. When crowds flock to Miami to see Lolita perform, they are seeing a depressed and grieving whale, explains Dr. Visser. How is that educational? How is witnessing such animal suffering entertainment? The orca in Miami before Lolita was Hugo, who exhibited what scientists call the "depressed whale syndrome" --listless swimming in endless circles, dorsal fin flopped to the side, and ramming his head against the glass tank repeatedly. Hugo died of a brain aneurism from this suicidal head trauma. Another captive whale, Corky, is in San Diego's Sea World; and there are other captive orcas all over the world.

Public opinion is now decidedly turning against orcas and other dolphins in captivity. In 2014, NMFS officially agreed that Lolita should be listed with her native Southern Resident pods as endangered; that ESA listing should become official by Jan. 27th. There is a robust plan to compassionately retire and return Lolita to the wild. Orca network and Center for



Lolita swims alone in Miami's Seaquarium. (Credit: Gigi Glendinning).

Whale Research have outlined a step-by-step rehab for her successful rehabilitation.

We are maturing in our relationship with orcas. Here in the Northwest, we now celebrate our J, K, and L pods. Each orca birth is front-page news and met with great ceremony and jubilation. Video of our "New Year's" orca calf, J50, is heartily welcomed as hope for a pod that has dwindled down to 78 residents, after the recent deaths of a pregnant mother and another calf. Schoolchildren compete to name the new female orca and we watch with open-hearts every time the new calf is spotted surfacing, tucked securely between her mother, Slick, and auntie, swimming free.

For these highly intelligent, socially sophisticated, and family-loving orcas, we can do so much better than continuing to enslave and teach our children that these sentient fellow creatures should be captive in cement bathtubs for life.

"We live by stories that we make and tell," says Orca Network's Howard Garnett, who has long led this campaign to free Lolita. He reminds us that orcas have brains like hard drives with a lot of storage and memories. When Lolita returns to her home waters, she will draw upon her big-brain memories of this home and her deep family bonds. "It will all come back to her," he says.

Just as we once stole Lolita away from her pod, we can now finally bring her back home to her family -- and to us.

http://www.huffingtonpost.com/brenda-peterson/march-for-orcas-free-a-wh_b_6472194.html

'Megajaws' Kept Blue Whale Small

By John Ross

Oct. 23, 2014 — Scientists have pinpointed the event that allowed the world's biggest living creature

to emerge — the demise of the world's biggest ever shark.

The bus-sized "Carcharocles megalodon", an 18-metre behemoth that feasted on marine mammals, is one of the most celebrated monsters of the deep. About four times as big as a great white, it evolved around 15 million years ago.

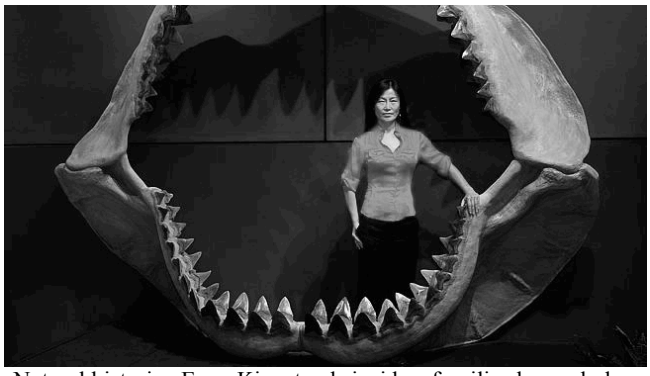
Scores of fossils and toothy reconstructions make megalodon a museum favourite. But despite its popularity and widespread fossil record, little has been known about its extinction.

Now an analysis of 42 of the most recent fossils has found the monster disappeared 2.6 million years ago — just before the filter-feeding baleen whales became giants.

The finding, and the fact that fossils of baleen whales are often found with megalodon teeth, suggests that the monster's diet included the ancestors of humpbacks, southern rights and even blue whales, considered the heaviest creature ever.

Announcing the finding this morning in the journal PLOS ONE, the team says more research is needed to be sure that megalodon ate baleen whales. But it was only after megalodon's extinction that baleen whales reached their "modern gigantic sizes", the paper says.

Lead author Catalina Pimiento, of the University of Florida, said it was not clear what had killed off megalodon. "That will be the subject of my next project," she said.



Natural historian Enya Kim stands inside a fossilised megalodon jaw. (Credit: AFP).

http://www.theaustralian.com.au/higher-education/megajaws-kept-blue-whale-small/story-e6frgcjx-1227098988961

San Francisco Recognizes Whales' and Dolphins' Right to Freedom

Oct. 22, 2014 — Reports are emerging of a landmark resolution passed this week by the San Francisco Board of Supervisors recognizing whales' and dolphins' right to freedom from captivity.

According to reports the resolution states that whales and dolphins deserve '*to be free of captivity, and to remain unrestricted in their natural environment*'. The resolution was championed by Commissioner Russell Tenofsky and backed by both San Francisco Supervisor Scott Wiener, Dr Lori Marino and sponsored by Earth Island Institute's International Marine Mammal Project.

An earlier initiative known as the Malibu proclamation, which reflects the sentiments outlined in the Declaration of Rights for Cetaceans: whales and dolphins provides another great example of progressive thinking at the local level. This may provide a future example of how the principles of the Declaration of Rights for Cetaceans may be implemented at the municipal or state level.

With Sea World shares and popularity plummeting, this great news from San Francisco, the Malibu proclamation and even the Indian Government citing the intelligence and sentience of dolphins as a reason to ban any future development of dolphinaira, is this the death knell of the cetacean captivity industry finally tolling?

http://us.whales.org/blog/2014/10/san-francisco-recognises-whales-and-dolphins-right-to-freedom

Floating Robot Tech Lets You Track Great White Sharks Swimming Along California Coast in Real Time

By John Ross

Jan. 29, 2015 — Beneath the surface of the ocean off the California coast, lies the mysterious world of a ferocious predator: the Great White Shark.

"I'm a surfer and I spend countless hours here. I would never want to see one in that water," said Paddy Sullivan of San Francisco.

Not much is known about the behavior and lifestyle of white sharks.

But now, thanks to marine biologists at Hopkins Marine Station at Stanford University, the Monterey Bay Aquarium, and the Monterey Bay Aquarium Research Institute — along with a remarkable sea-faring robot out of Silicon Valley — some secrets of these oceanic giants are coming to light.

For the first time ever, online and in real time, scientists as well as the public can detect and track the locations of white sharks along California's central coast.

"Within seconds of a white shark swimming by, we receive the signal and right to your iPhone or another device, you can actually see the shark that's there," said Prof. Barbara Block, an expert in how large pelagic fishes utilize the open ocean environment.

Their efforts are part of a program known as the global Tagging of Pelagic Predators or TOPP for short.

TOPP is an international, multidisciplinary collaboration among biologists, engineers, computer scientists and educators. You can see the real time shark locations on the TOPP website. Once there, click on "Glider," then "current" glider and zoom in on the colorful markers. Those red markers reveal where and when the Great Whites are traveling. Right now, it's showing a group of white sharks near Ano Nuevo State Park in San Mateo County.

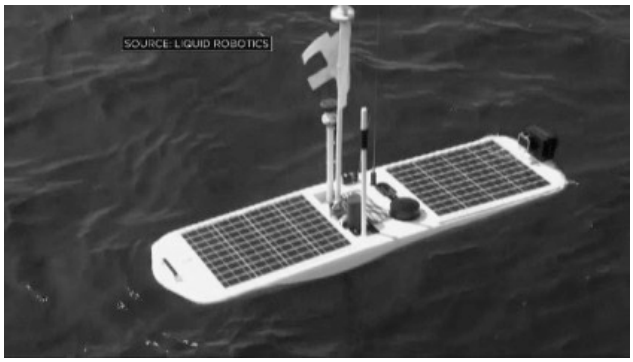
"You know we've got a technology and a platform that can do things that no one has been able to do before," said Gary Gysin. Gysin is the CEO of Liquid Robotics, the inventor of the seafaring robot.

The project has been funded by Rolex, Discovery and the Monterey Bay Aquarium. Dr. Block is a Rolex Laureate who was awarded the prestigious prize for her independent thinking and innovative approach to tagging pelagic fishes.

Here's how the sharks are tracked: In a tiny dinghy scientists from Stanford and the Monterey Bay Aquarium travel to hot spots off the coast where great whites are known to gather. From the boat, using a seal decoy, they lure the sharks to the surface and tag them with a special acoustic device. The device sends out a coded ping.

"And we've put receivers in those areas that receive acoustic signals," explained marine biologist Dr. Randy Kochevar.

The code goes straight up to orbiting satellites and then back down to the web, revealing the locations of the sharks.



WaveGlider is a floating sensor buoy that tracks movements of Great White Sharks off the California coast. (Credit: Liquid Robotics).

Using the latest technology, scientists have placed Iridium enabled "smart" buoys around the hot spots which include: Ano Nuevo, Hopkins Marine Station in Pacific Grove, Tomales Bay, the Farallones, Chagos, and Palmyra. But the data "king of the sea" is the seafaring robot known as a Wave Glider.

"We can stay out at sea for up to a year," said Gysin.

It's what's inside these wave gliders that makes Silicon Valley tick.

"The brains of the operation are this box right here," explained Greg Lynch. Lynch is an electro-mechanical specialist with Liquid robotics. He showed KPIX 5 how the glider works.

Inside, under solar panels, are a command and control box, GPS, Iridium satellite link, cellular and Wi-Fi communications. The glider is packed with sensors and uses a cloud-based operating system.

And while its route is pre-programmed thousands of miles away, humans in a control room at Liquid Robotics monitor it — and can steer it over the Internet.

"It's a great technology," said Lynch.

The glider uses no fossil fuel; only renewable energy. It can travel across oceans. The Wave Glider is powered by solar panels, and propelled by a system that converts ocean waves into energy. It is also extraordinarily quiet. Now, this Silicon Valley glider is giving scientists invaluable information about the hidden world of California's great whites.

"If we understand what is happening with the predators, we can begin to get a picture of how the whole ecosystem functions," said Kochevar.

"There are all sorts of things going on that we can measure better with this technology and really protect it and preserve it," said Gysin.

Here's the great hope for the great whites: if we can see them, we may want to protect them as well as our endangered oceans.

"We just need to know more and I think that technology serves to that end," said surfer Paddy Sullivan.

There is still a large number of white sharks off the Central California Coast, and they will be here for the next few weeks. By the end of February, some will go to Hawaii and others will travel midway to Hawaii at a spot the scientists have dubbed "The Shark Café." It is still a mystery why they stop every year at this spot and what they do when they get there. Eventually, they will return to the California Coast.

http://sanfrancisco.cbslocal.com/2015/01/29/great-white-sharks-robots-california-coast-tracked-real-time/

American Cetacean Society
Monterey Bay Chapter
P.O. Box H E
Pacific Grove, CA 93950

RETURN SERVICE REQUESTED

Nonprofit
Organization
U.S. Postage
PAID
Monterey, CA
Permit No. 338

MONTEREY COUNTY HOTLINES for Marine Mammals

Strandings/Entanglements/Distress
24-hour toll-free
877-767-9425

Harassment
NOAA Enforcement, Monterey
831-853-1964

American Cetacean Society Membership Application Chapter#24

New Membership/Subscription ___ Gift Membership/Subscription___
Renewal ___

Name _____

Address_____Email_____

City, State, Zip_____

Membership level _____

Membership levels and Annual dues:

Lifetime $1000 Patron $500 Contributing $250
Supporting $85 International $55 Family $55 Individual $45
Student $35 Teacher $35 Senior (62 plus) $35

Subscription only * $15/11 issues (*not entitled to membership benefits)

Check___Mastercard___Visa___Expiration date_____

Signature_____

Make checks payable to: ACS/Monterey Bay Chapter
Return to: Membership Secretary, ACS Monterey Bay Chapter
P.O. Box H E Pacific Grove, CA 93950

Monterey Bay Chapter Officers & Chairs, 2015

Richard Ternullo, *President*
Tony Lorenz, *Vice President*
Randy Puckett, Jerry Loomis, *Past Chapter Presidents*
Thom Akeman, *Publicity*
Katy Castagna, *Treasurer*
Sally Eastham, *Membership*
Jennifer Thamer, *Secretary*
Tim Thomas, *Historian*
Carol Maehr, *Conservation*
Melissa Galieti, *Programs*
Rene Rodriguez, *Education*
David Zaches, Art Haseltine, Debbie Ternullo *Members at Large*
Diane Glim, *ACS National President*

Evelyn Starr, *Webmaster*
Tony Lorenz, Oren Frey, *Editors*
Email: tonylorenz@bigbluebay.com
soundingsnewsletter@gmail.com