

# Soundings



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

**JANUARY 2017**

**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, January 26, 2017**

**Time: 7:30 PM**

**PLEASE JOIN US AT 7:00 FOR REFRESHMENTS**

**Speaker: Jodi Frediani**

**Title: The (Not So) Secret Lives of Humpback Whales on their  
Breeding/Calving Grounds**

Each year, humpback whales migrate from their temperate feeding grounds to the tropics where they breed and calve. However, no one has ever observed humpback whales mating or giving birth (well, maybe once off Madagascar). So what exactly do they do in those tropical waters? Join local wildlife photographer, Jodi Frediani, to learn more about humpback whale behavior when they are far away from Monterey Bay and their other feeding grounds.

Jodi will share her knowledge and observations gleaned from more than 11 months spent on calving grounds of the North Atlantic and South Pacific humpback whales. She'll even include stories about individual whales she has come to know. Her presentation will be illustrated with her outstanding photographic images, taken both topside and underwater. Jodi's passion for whales and photography is palpable and contagious. Come learn about competitive 'rowdy' groups, dancing whales, singers, and what moms and calves do during those long months when mom undertakes a total fast, while nursing junior.

Jodi Frediani worked for 35 years as an environmental forest and watershed consultant and animal trainer. Her passions include photography, animals and anything to do with water. She first picked up a camera at age 12 and has been photographing animals ever since. For the past 7 years, she has focused on marine species of Monterey Bay, and for the last 15 seasons Jodi has been swimming with and photographing the North Atlantic humpback whales in the warm waters of the Silver Bank Marine Mammal Sanctuary, Dominican Republic. She has also spent time swimming with and photographing humpback whales in Tonga.

Her images have been featured in local and regional papers, in national media such as The Atlantic and Wired.com, on BBC's "Nature's Weirdest Events" and in Carl Safina's National Geographic blog, "Ocean Views." Jodi's work can be seen at [www.jodifrediani.com](http://www.jodifrediani.com).

**Please join** us for refreshments before the program begins. More information is available on our website, [www.acsmb.org](http://www.acsmb.org).

**Next month:** Our next meeting will be at 7 PM on Thursday, February 23, when Dr. Baldo Marinovic will present on krill.

## INSIDE THIS ISSUE

CALENDAR .....2

**WARMER WATERS HAVE  
MORE BOTTLENOSE DOLPHINS  
TURNING UP IN SF BAY.....3**

**NEW TAG REVOLUTIONIZES  
WHALE RESEARCH, AND  
MAKES THEM PARTNERS IN  
SCIENCE.....4**

**SHEDDING LIGHT ON THE  
ORIGIN OF THE BALEEN  
WHALE.....5**

**NEW FORECAST TOOL HELPS  
SHIPS AVOID BLUE WHALE  
HOTSPOTS.....5**

**SIGHTINGS.....7**

**MEMBERSHIP.....8**



*Humpback Whale tail on December 3, 2016. (Credit: Daniel Bianchetta).*

## CALENDAR

**Jan. 16 – Mar. 25:** 2017 Worldwide Blue Mind Online Book Club. A unique ten week read-along event for waterfront communities and independent booksellers around the world. Free registration on Facebook or Eventbrite. For more information go to [bluemind.life](http://bluemind.life).

**Jan. 27-28, 2017:** Southern California Marine Mammal Workshop in Newport Beach, CA. Keynote speakers will include Dr. Sam Ridgeway, John Calambokidis, and Dr. John Hildebrand. For more information go to [socialmarinemammals.org](http://socialmarinemammals.org).

**Jan. 28-29, 2017:** Whalefest in Monterey. Symposium Speakers Include: Ted Cheeseman, Dan Costa, Jeremy Goldbogen, Michael Graham, and David Jessup. In addition to the plethora of renowned speakers there will be documentaries and a multitude of educational displays designed to educate and empower the public. ACSMB will have a booth on Sunday, January 29. For more information go to: <http://www.montereywharf.com/event/7th-annual-whalefest-monterey.html>.

**Jan. 29, 2017:** ACSMB's Gray Whale Fundraiser will take place from 8am-10am, with Princess Monterey Whalewatching.

**Feb. 11, 2017:** Presentation by Photographer Frans Lanting and his partner Chris Eckstrom: Journeys To The Ends Of The Earth. Two shows: 3:00 PM and 7:00 PM, at the Rio Theatre in Santa Cruz. Tickets on sale at Brown Paper Tickets at: <http://seymourcenter.brownpapertickets.com/>.

**Feb. 22-25, 2017:** Pacific Seabird Group 44<sup>th</sup> Annual Meeting in Tacoma, Washington: "Sound to Sea: Marine Birds Across the Seascape."

**Mar. 16, 2017:** Presentation by Salvador Jorgensen of the Monterey Bay Aquarium, from 4:00 PM to 5:00 PM: Tracking Great White Sharks in the White Shark Café. Presentation will take place at Moss Landing Marine Labs. For more information go to: [mml.calstate.edu](http://mml.calstate.edu).

### ACSMB

### Gray Whale Fundraiser



Join us in one of the best places along the West Coast to observe the southbound migration of the Pacific Gray Whale. Monterey Bay is a migratory corridor for southbound gray whales and our whale watch fleet is only a few miles from a major gray whale migratory highway! In addition to gray whales we will be on the lookout for Killer Whales and numerous species of delphinids that frequent Monterey Bay. Local gray whale experts will be on board to answer any questions.

**Date:** Sunday, January 29, 2017

**Time:** 8am-10am

**Cost:** \$40

*All proceeds benefit research, conservation and education programs funded by ACS.*

**For more information:**

Contact Princess Monterey  
Whale Watching at 831-372-2203

## BOOK RECOMMENDATIONS

Spineless: Portrait of Marine Invertebrates, the Backbone of Life, by Susan Middleton. 2014 Harry N. Abrams.

Baja California Plant Field Guide, 3<sup>rd</sup> Edition: by Jon P. Rebman and Norman C. Roberts. 2012 Sunbelt Publications.

## WARMER WATERS HAVE MORE BOTTLENOSE DOLPHINS TURNING UP IN SF BAY

By David Perlman

Jan. 2, 2017 — Bottlenose dolphins are moving north from their warm-water haunts in the ocean waters off Southern California, and seaside observers are spotting more and more of them as far north as Mendocino.

Some seem to be taking up temporary residence inside San Francisco Bay, while others appear to be commuters from distant waters, marine biologists say.

Whether their movements mark another signal of a changing climate is still unknown, but the phenomenon is more than a curiosity, and the scientists are tracking the marine mammals closely.

And while the aggressive pinnipeds don't normally attack their smaller harbor porpoise cousins, cases of aquatic murder that naturalists call "porpicides" are on the rise.

Scientists studying the lives and movements of the dolphin species, called *Tursiops truncatus*, recalled the startling change in their range over the past decade or so during a recent research meeting at San Francisco State University's Romberg Center in Tiburon.

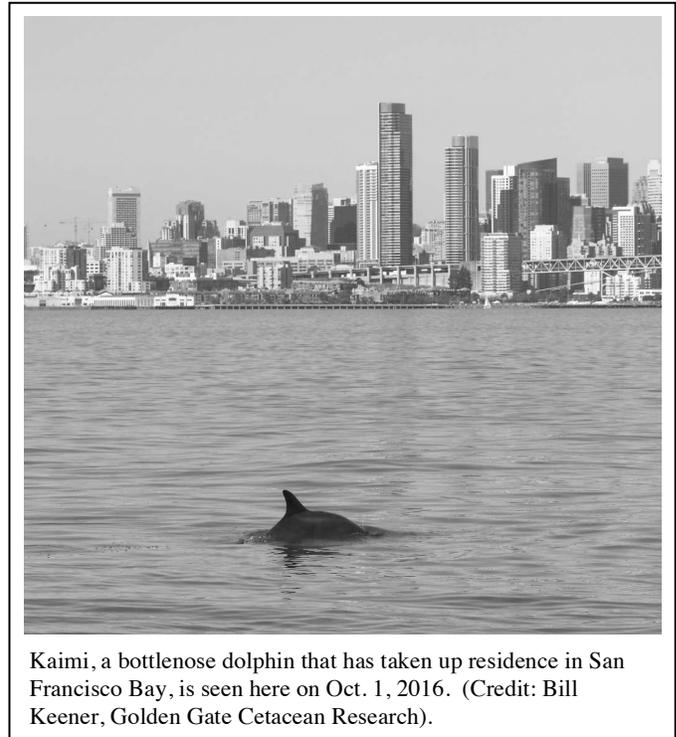
Once seen only rarely north of Santa Barbara, more than 400 bottlenose dolphins have recently been spotted north of Pescadero Point in San Mateo County, and nearly 100 of them have been identified as regular residents in local waters, said marine biologist William Keener of Golden Gate Cetacean Research.

Tracking individual dolphins as they move up and down the coast, the naturalists have identified many by the unique patterns — bite-marked notches on their dorsal fins that come from playful fighting or attacks by hungry sharks.

Keener's colleagues spotted the first dolphin in the bay more than 15 years ago, and "now they come and go in small groups of six or 10 on an irregular schedule," he said. The researchers have now counted a total of 91 animals swimming in and around the bay from Ocean Beach to the Marin coast and are keeping detailed records on more than 70 of them to chart their still-mysterious migration patterns, he said.

Those dolphins have been seen by professional and amateur observers as far away as Monterey Bay, Santa Monica and even Ensenada on the coast of Baja California, more than 600 miles away, Keener said.

Dolphin researchers give each animal they spot a number for their records, and sometimes a name. A



Kaimi, a bottlenose dolphin that has taken up residence in San Francisco Bay, is seen here on Oct. 1, 2016. (Credit: Bill Keener, Golden Gate Cetacean Research).

dolphin named Smootch, for example, is a regular in the bay but has been spotted by researchers at least 21 times traveling up and down the coast between San Francisco and Ensenada.

Seven dolphins were spotted as far north as Point Arena in Mendocino County in April, and Keener said he saw one of them, a male named Vibe, swimming beneath the Golden Gate Bridge in February. Vibe swam back from Mendocino in June and was spotted again off Ocean Beach, "where he participated in an attack on a couple of harbor porpoises," Keener said.

One local dolphin who stays in town is Kaimi, a bottlenose who hangs out around a green harbor buoy off the former Alameda Naval Air Station, where members of the O Kalani Outrigger Canoe Center paddle out from nearby Encinal Boat Ramp to visit the dolphin frequently — from a distance.

"You can hear Kaimi breathing regularly, and it makes a pretty sound over the water," said Jaz Zaitlin, a canoe club racer. "It's often there, along with a big brown sea lion, and many of us can watch it when we're on the water. The name means Seeker."

But Keener, the biologist, is concerned: "Dolphins are very social animals, and they move up and down the coast in groups, but Kaimi's all alone, so now we want to keep an eye on her to make sure she's really healthy."

Cases of porpicide, first detected in 2011, when six dolphins were identified, have been increasing steadily, according to Keener and Padraig Duigman,

chief pathologist at the Marine Mammal Center in Sausalito. There have been 35 cases since then, Keener said.

"It's basically teenage males doing what they do best — like bully others, or (they have) too much energy to burn off, and too much time on their hands," Duignan said.

It's still too soon to tell whether the changing climate is influencing the northward movement of the dolphins, Keener said. It's likely that sea surface temperatures have been higher during the recent El Niño. If it becomes permanent, he said, "then we might predict the dolphins could become more established farther north, as temperature and food allow."

<http://m.sfgate.com/science/article/Warmer-waters-have-more-bottlenose-dolphins-10831036.php>

## NEW TAG REVOLUTIONIZES WHALE RESEARCH, AND MAKES THEM PARTNERS IN SCIENCE

Dec. 23, 2016 — A sophisticated new type of "tag" on whales that can record data every second for hours, days and weeks at a time provides a view of whale behavior, biology and travels never before possible, scientists from Oregon State University reported in a new study.

This "Advanced Dive Behavior," or ADB tag, has allowed researchers to expand their knowledge of whale ecology to areas deep beneath the sea, over thousands of miles of travel, and outline their interaction with the prey they depend upon for food.

It has even turned whales into scientific colleagues to help understand ocean conditions and climate change.

The findings, just published in the journal *Ecology*



The new ADB tag helps monitor the behavior of a whale. (Credit: Oregon State University).

and *Evolution*, showed sperm whales diving all the way to the sea floor, more than 1000 meters deep, and being submerged for up to 75 minutes. It reported baleen whales lunging after their food; provided a basis to better understand whale reactions to undersea noises such as sonar or seismic exploration; and is helping scientists observe how whales react to changes in water temperature.

"The ADB tag is a pretty revolutionary breakthrough," said Bruce Mate, professor and director of OSU's Marine Mammal Institute in the College of Agricultural Sciences. "This provides us a broad picture of whale behavior and ecology that we've never had before.

"This technology has even made whales our partners in acquiring data to better understand ocean conditions and climate change," Mate said. "It gives us vast amounts of new data about water temperatures through space and time, over large distances and in remote locations. We're learning more about whales, and the whales are helping us to learn more about our own planet."

The new tag, the researchers say, expands by several orders of magnitude the observations that can be made of whale feeding and behavior. Researchers say it's showing what whales do while underwater; when, how and where they feed; how they might be affected by passing ships or other noises; and what types of water temperatures they prefer.

In the new study, researchers outlined the continued evolution and improvements made in the ADB technology from 2007-15, in which it was used on sperm, blue and fin whales. The research has been supported by the Office of Naval Research, the U.S. Navy and the International Association of Oil and Gas Producers.

"By using this technology on three different species, we've seen the full range of behavior that is specific to each species," said Daniel Palacios, a co-author on the study. "Sperm whales, for instance, really like to dive deep, staying down a long time and appearing to forage along the seafloor at times. During summer the baleen whales will feed as much as possible in one area, and then they move on, probably after the prey density gets too low."

Unlike earlier technology that could not return data from the deep sea for much longer than a day, the new ADB tags are designed to acquire data constantly, for up to seven weeks at a time, before they detach from the whale, float to the surface and are retrieved in the open sea to download data. The retrieval itself is a little tricky -- scientists compare it to searching for a hamburger floating in thousands of square miles of

open ocean -- but it has worked pretty well, thanks to the tags transmitting GPS-quality locations and flashing LED lights once they have released.

The tag can sense water depth, whale movement and body orientation, water temperature and light levels.

"With this system we can acquire much more data at a lower cost, with far less commitment of time by ships and personnel," said Ladd Irvine, the corresponding author on the study. "This tag type yields amazing results. It's going to significantly expand what we can accomplish, learning both about whale ecology and the ocean itself."

<https://www.sciencedaily.com/releases/2016/12/161223115823.htm>

## **SHEDDING LIGHT ON THE ORIGIN OF THE BALEEN WHALE**

Nov. 30, 2016 — Monash University scientists have played a key role in discovering the origin of filter feeding in baleen whales -- the largest animal known to have ever existed.

The discovery is detailed in a paper co-written with international researchers and palaeontologists from Museum Victoria. 'Alfred' the 25- million-year-old fossilised whale skull was unveiled at the Museum today.

"Alfred shows how ancient baleen whales made the evolutionary switch from biting prey with teeth to filtering using baleen," said Monash Science Senior Research Fellow, Dr. Alistair Evans, one of the authors of the paper.

"They first became suction feeders. Feeding in this way resulted in reduced need for teeth, so over time their teeth were lost before baleen appeared."

There has been a lot of mystery around how and when baleen first formed.

"But we now have long-sought evidence of how



This is Alfred the 'fossil' whale skull. (Credit: Ben Healley).

whales evolved from having teeth to hair-like baleen -- triggering the rise of the biggest beasts on the planet," said Dr Evans. Nick-named 'Alfred', the fossil skull is from an extinct group of whales called aetiocetids, which despite having teeth were an early branch of the baleen whale family tree.

Alfred's teeth show exceptionally rare evidence of feeding behaviour suggesting an entirely new evolutionary scenario -- before losing teeth and evolving baleen, these whales used suction to catch prey.

Today's baleen whales -- such as the Blue and Humpback -- don't have teeth. Instead, they have evolved the hair-like structure called baleen that allows them to filter huge amounts of tiny plankton, like krill, from seawater.

"Filter-feeding is the key to the baleen whales' evolutionary success," said Dr. Erich Fitzgerald, Senior Curator of Vertebrate Palaeontology, Museums Victoria.

"But what has really eluded scientists since Charles Darwin is exactly how whales made the complex evolutionary change from biting prey with teeth to filtering plankton using baleen."

This unusual type of tooth wear is only seen in a few living marine mammals (such as walrus) that use a back-and-forth movement of their tongue to suck in prey, and incidentally rough material like sand.

Alfred shows how ancient baleen whales made the evolutionary switch from biting prey with teeth to filtering using baleen: they first became suction feeders. Feeding in this way resulted in reduced need for teeth, so over time their teeth were lost before baleen appeared.

The research team is now uncovering the rest of Alfred's skeleton, as well as other fossils from Australia that provide exciting insights on how baleen whales began.

Find the report online at:

[https://museumvictoria.com.au/pages/383548/071-082\\_MMV75\\_Marx\\_3\\_WEB.pdf](https://museumvictoria.com.au/pages/383548/071-082_MMV75_Marx_3_WEB.pdf)

<https://www.sciencedaily.com/releases/2016/11/161130131131.htm>

## **NEW FORECAST TOOL HELPS SHIPS**

### **AVOID BLUE WHALE HOTSPOTS**

#### **SATELLITE TRACKING INFORMS MAPS OF BLUE WHALE DENSITY OFF WEST COAST**

Nov. 29, 2016 — Scientists have long used satellite tags to track blue whales along the West Coast, learning how the largest animals on the planet



A blue whale surfaces near shipping traffic off the California Coast. A new forecast system will help identify blue whale hotspots to help ships avoid them. (Credit: John Calambokidis, Cascadia Research Collective).

find enough small krill to feed on to support their enormous size.

Now researchers from NOAA Fisheries, Oregon State University and the University of Maryland have combined that trove of tracking data with satellite observations of ocean conditions to develop the first system for predicting locations of blue whales off the West Coast. The system, called WhaleWatch, produces monthly maps of blue whale "hotspots" to alert ships where there may be an increased risk of encountering these endangered whales.

NOAA Fisheries has begun publicly posting the maps on its West Coast Region website each month. A new scientific paper published in the *Journal of Applied Ecology* describes the development of the WhaleWatch system and the methodology behind it.

"We're using the many years of tag data to let the whales tell us where they go, and under what conditions," said Elliott Hazen, a research ecologist at NOAA Fisheries Southwest Fisheries Science Center and lead author of the new paper. "If we know what drives their hotspots we can more clearly assess different management options to reduce risk to the whales."

Helen Bailey, the WhaleWatch project leader at the University of Maryland Center for Environmental Science and coauthor of the paper, described WhaleWatch as an innovative combination of satellite technology and computer modeling that will help protect whales by providing timely information to the shipping industry. NASA helped fund the project, which draws on ocean observations from NASA and NOAA satellites.

"This is the first time that we've been able to predict whale densities on a year-round basis in near-

real time," said Bailey, who specializes in studying the movements of marine mammals and hopes the same approach will be used for other species of whales. "We hope it's going to protect the whales by helping inform the shipping industry."

Blue whales are listed as an endangered species, although their population has increased in recent years. Earlier research has found that shipping lanes to and from Los Angeles and San Francisco overlap with important blue whale foraging hotspots, putting whales at risk of fatal ship strikes.

Studies have found that ships off the West Coast strike an average of about two blue whales a year, although some ship strikes probably go unnoticed.

"No ship captain or shipping company wants to strike a whale," said Kip Louttit, executive director of the Marine Exchange of Southern California, which tracks ship traffic into and out of Southern California ports. "If we can provide good scientific information about the areas that should be avoided, areas the whales are using, I think the industry is going to take that very seriously and put it to use."

NOAA Fisheries has developed a California Current Integrated Ecosystem Assessment to examine how environmental conditions affect marine resources including whales and other marine mammals. Hazen said WhaleWatch could help evaluate different management strategies to tell whether they are effective in reducing risk to whales.

"This is where science meets management," he said. "Now we have the tools for scientists to predict outcomes of different decisions or choices." As the scientists note in the new paper, the WhaleWatch model "provides a critical step towards developing seasonal and dynamic management approaches to help reduce the risk of ship strikes for blue whales in the California Current."

Maps produced by the model may also prove useful to fishermen who want to reduce the risk of whales becoming entangled in lines attached to crab traps or other gear.

The strength of WhaleWatch is more than a decade of tracking data collected by Bruce Mate of Oregon State University and his team for more than 100 blue whales from 1994 to 2008. Hazen used computer models to look for relationships between the movements of the whales and environmental factors such as ocean temperature, chlorophyll concentrations and other factors.

"Nobody has ever had a database like this for any whale anywhere in the world," Mate said. "These aren't guesstimates of how whales may respond to certain conditions, but actual data on how they did

respond, which improves the accuracy of the predictions."

<https://www.sciencedaily.com/releases/2016/11/161129150209.htm>

## SIGHTINGS

Sightings are compiled by Monterey Bay Whale Watch. For complete listing and updates see <http://www.montereybaywhalewatch.com/slstcurr.htm>

Date	#	Type of Animal(s)
1/6 1:30 pm	15	Gray Whales
1/6 10 am	6	Gray Whales
	2	Humpback Whales
1/5 10 am	6	Gray Whales
1/4 10 am	4	Gray Whales
	4	Humpback Whales
1/3 10 am	8	Gray Whales
1/2 1:30 pm	6	Gray Whales
1/2 10 am	6	Gray Whales
1/1 10 am	2	Humpback Whales
12/31 1:30 pm	11	Gray Whales
	6-8	Fin Whales
	1	Mola Mola (Ocean Sunfish)
	1	Black-footed Albatross
12/31 11:30 am	3	Humpback Whales
	9	Gray Whales
	1	Fin Whale
12/31 10 am	13	Humpback Whales
	2	Gray Whales
	1	Mola Mola (Ocean Sunfish)
12/31 8 am	5	Humpback Whales
	5	Gray Whales
	500	Pacific White-sided Dolphins
12/30 1:30 pm	17	Gray Whales
	1	Blue Whale
	50	Risso's Dolphins
12/30 10 am	3	Humpback Whales
	3	Gray Whales
	300	Pacific White-sided Dolphins
	40	Risso's Dolphins
12/30 7 am	1	Humpback Whale
	6	Gray Whales
	80	Pacific White-sided Dolphins
	40	Risso's Dolphins
	25	Northern Right Whale Dolphins
12/29 1:30 pm	6	Humpback Whales
	6	Gray Whales
	450	Pacific White-sided Dolphins
	20	Risso's Dolphins
12/29 10 am	3	Humpback Whales
	6	Killer Whales
	1000	Pacific White-sided Dolphins
12/29 7 am	7	Gray Whales
	300	Pacific White-sided Dolphins
12/28 1:30 pm	13	Gray Whales
12/28 10 am	11	Gray Whales
12/27 1:30 pm	4	Humpback Whales
	1	Gray Whale

	1	Fin Whale
	300	Pacific White-sided Dolphins
	100	Northern Right Whale Dolphins
	1	Black-footed Albatross
12/27 10 am	6	Gray Whales
12/22 1:30 pm	6	Humpback Whales
	3	Gray Whales
	100	Pacific White-sided Dolphins
12/22 10 am	8	Humpback Whales (2 breaching)
	2	Gray Whales
	150	Risso's Dolphins
12/21 1:30 pm	3	Humpback Whales
	150	Risso's Dolphins
12/21 10 am	7	Humpback Whales
12/20 1:30 pm	8	Humpback Whales
	100	Risso's Dolphins
12/20 10 am	6	Humpback Whales
	60	Risso's Dolphins
12/18 10 am	3	Humpback Whales
	3	Killer Whales
12/17 1:30 pm	2	Humpback Whales
12/17 10 am	2	Humpback Whales
12/14 9 am	4	Humpback Whales (lots of surface lunge-feeding!)
	30	Long-beaked Common Dolphins
12/13 9 am	3	Humpback Whales
	25+	Offshore Killer Whales
	2	Gray Whales
	150	Risso's Dolphins
12/12 9 am	10	Humpback Whales
12/11 9 am	2	Humpback Whales
	10	Pacific White-sided Dolphins
	80	Risso's Dolphins
12/10 9 am	7	Humpback Whales
	7	Dall's Porpoise
12/9 9 am	2	Humpback Whales
	1	Southern Sea Otter eating a Dungeness Crab
12/7 9 am	4	Humpback Whales
	2	Gray Whales
	2	Fin Whales
	145	Risso's Dolphins
	7	Black-footed Albatross
	1	Laysan Albatross
12/6 9 am	8	Humpback Whales ("friendly" encounter)
12/4 2 pm	6	Humpback Whales
	600	Long-beaked Common Dolphins
12/4 9 am	24	Humpback Whales
	750	Long-beaked Common Dolphins
12/3 2 pm	6	Humpback Whales
		A surreal sunset!
12/2 9 am	9	Humpback Whales
	450	Long-beaked Common Dolphins
12/1 9 am	4	Humpback Whales
	3	Gray Whales
	3	Pacific White-sided Dolphins
	200	Long-beaked Common Dolphins
	300	Risso's Dolphins

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

Membership/Subscription Type: New \_\_\_ Gift \_\_\_ 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, 2017**

Melissa Galieti, *President*  
Katlyn Taylor, *Vice President and Events*  
Katy Castagna, *Treasurer*  
Sally Eastham, *Membership*  
Jennifer Thamer, *Secretary*  
Melissa Galieti, *Programs*  
Art Haseltine, *Grants*  
David Zaches, Debbie Ternullo,  
*Members at Large*  
Diane Glim, *ACS National Representative*  
Randy Puckett, Jerry Loomis, *Emeriti*

Evelyn Starr, *Webmaster*  
Tony Lorenz, Oren Frey, *Editors*  
Email: [tonylorenz@bigbluebay.com](mailto:tonylorenz@bigbluebay.com)  
[soundingsnewsletter@gmail.com](mailto:soundingsnewsletter@gmail.com)