Soundings AMERICAN CETACEAN SOCIETY

American Cetacean Society – Monterey Bay Chapter PO Box HE, 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

Thursday, February 28, 2019 **Time**: 7:30 PM

Speaker: Dr. Shawn Noren



When IMS-UCSC research scientist Dr. Shawn Noren was asked by United States Geological Survey to "do a study on the bioenergetics of Pacific walruses" she had never seen a walrus, nor had she ever ventured to the Arctic. As Dr. Noren dove into the scientific literature, she realized that very little was known about these mysterious creatures. As her research unfolded, she found herself face to face with these enormous 1.800-3.700 lb creatures. Dr. Noren studied walruses for over five years, and her

research was cited throughout the 2017 Pacific Walrus Species Assessment Report to determine to list walrus under the Endangered Species Act.

Dr. Noren has studied marine mammals for over two decades, and seeks to understand how the unique physiology of marine mammals enables them to function in their "extreme" environments. Her research has taken her to an uninhabited island in Nova Scotia to study gray seal diving, to Antarctica to investigate Weddell seal thermoregulation, and to Hawaii to examine dolphin calf swimming (this research was part of the 2013 legislative decision to strengthen the dolphin-safe label). Her research has demonstrated that immature marine mammals are born initially lacking the physiology required to survive at sea, making them particularly susceptible to habitat perturbations. Dr. Noren's walrus research inspired her to study other Arctic marine mammals to aid in their conservation and management, and she is currently seeking funds to continue her research on beluga whales. If Dr. Noren's research inspires you, please consider making (or asking your employer to make) a tax-free donation to support her research by either going to the secure web site: http://giving.ucsc.edu/ (enter the designation code IM020F, Marine Mammal Lab into the special instructions field) or request a donation form by emailing Dr. Noren at snoren@ucsc.edu.

Next month: Our next meeting will be on Thursday, March 28 at Hopkins Marine Station. Please save the date and join us! More information is available on our website, www.acsmb.org.

FEBRURARY 2019

Monterey Bay Chapter

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ACS Monterey Bay chapter needs you!
Please consider volunteering to
serve on the ACS Board of

Directors. Current openings include Membership Chair and Publicity Chair.

If you enjoy learning about whales and sharing your passion with others, we'd like to speak with you. Please contact any board member for more information.

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CALENDAR

Now through March 17: Exhibit at the Oakland Museum of California: "Cruisin' the Fossil Coastline: The Art of Ray Troll and the Paleontology of Kirk Johnson"

Now through Nov. 22: Albatross Exhibit at the Seymour Center at Long Marine Lab: "A Perfect Day for an Albatross." Features Caren Lobel-Fried's book and artwork. The exhibit also features videos, albatross facts and hands-on activities about this remarkable seabird.

Jan. 18 – Apr. 14: Exhibit at the Pacific Grove Museum Of Natural History: Magnificent Migrations: A Journey Through Central California.

Feb. 16 – **Mar. 5:** Antarctic Peninsula Whales and Landscape Expedition, in partnership with ACS. Itinerary, ship details and how to signup at cheesemans.com/Ant-Whales-Feb2019.

Feb. 21: Hardcore Natural History Series at the PG Museum of Natural History: The Browns Of California: The Family Dynasty that Transformed the State. 6:30 – 8:00 PM.

Feb. 27 – Mar. 2: Pacific Seabird Group 46th Annual Meeting in Kauai, Hawaii at the Aqua Kauai Beach Resort. For more information please go to www.pacificseabirdgroup.org

Mar. 1: Friends of Hopkins Lecture Series: "Ray Troll, Fantastic Beasts from "Cruisin' the Fossil Coastline." 7:30 to 8:30 PM at Hopkins Boat Works Lecture Hall.

Mar. 2: University of California Museum of Paleontology's annual short course: Whale Watching through time: new insights into whale evolution, ecology, and adaptation. Speakers will include Annalisa Berta, Jeremy Goldbogen, and William Gearty. 9:00 AM to 4:00 PM at UC Berkeley. For more information and registration go to ucmp.berkeley.edu.

Mar. 2-3: Mendocino Whale Festival. Wildlife art exhibits, coastal whale watching, wine and beer tasting, chowder tasting.

Mar. 7-10: 16th Annual San Francisco International Ocean Film Festival. A complete schedule of the films has been listed on the international film fest website. Films will be shown throughout the Bay Area and cover topics ranging from blue whales to sharks. Over 60

ocean-related films will be shown over a four day period. Go to www.intloceanfilmfest.org for details.

Mar. 21: Hardcore Natural History Series at the PG Museum of Natural History: Unearthing the California Grizzly: Explore the natural history of the now extinct California Grizzly with Dr. Alexis M. Mychajliw of the La Brea Tar Pits. 6:30 - 8:00 PM.

Mar. 23: Global Oceans Gala Honoring John Laird at the Seymour Marine Discovery Center in Santa Cruz.

Apr. 9: Friends of Hopkins Lecture Series: "Roz Naylor. Oceans and the Future of Food." 7:30 to 8:30 PM at Hopkins Boat Works Lecture Hall.

Apr. 19: Friends of Hopkins Lecture Series by Roz Naylor: "Oceans and the Future of Food." 7:30 - 8:30 PM at the Boat Works Lecture Hall.

BEAKED WHALES' INCREDIBLE DIVING ABILITIES CONFIRMED

Feb. 6, 2018 — A new Duke University-led study provides the first detailed record of the diving behavior of Cuvier's beaked whales in U.S. Atlantic waters.

Cuvier's beaked whales are the world's deepestdiving mammal, but studies of their behavior are constrained by the animals' offshore location and limited time spent at the surface.

The new data, recorded from 5,926 dives of tagged whales off Cape Hatteras, N.C., showcases the remarkable diving abilities of these animals and provides new clues to how they make a living at the extremes of depth and cold.

"Their deep dives average about 1,400 meters, lasting about an hour, while they are feeding near the sea floor. They typically only spend about two minutes at the surface between dives," said Jeanne Shearer, a doctoral student in ecology at Duke University's Nicholas School of the Environment. "It's amazing that they can dive to such depths, withstand the pressure, and be down there that long, with such brief recovery times."

Past studies have documented the diving behavior of Cuvier's beaked whales in Pacific waters, Italy, and the Bahamas, but this is the first one focused in the U.S. Atlantic. Scientists estimate about 6,500 Cuvier's beaked whales live in the northwest Atlantic. Populations in different areas exhibit some differences in diving behavior, highlighting the need for data from around the world.

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To conduct the study, scientists attached LIMPET satellite-linked tags to 11 Cuvier's beaked whales that live and dive most of the year in waters a two-hour boat ride from Cape Hatteras. One tag failed, but the other 10 recorded 3,242 hours of behavioral data from 5,926 individual dives -- both deep and shallow -- between 2014 and 2016.

Aside from the extremely deep dives that these whales are able to make, the data showed that they dive nearly continually, with deep dives followed by 3-4 shallow dives that extend to around 300 meters. How they continuously dive to these depths without long recovery periods is still a mystery to scientists.

"Cuvier's beaked whales are only half the size of the sperm whale," Shearer said. "Their dives push the limits of mammalian physiology, but we still don't know how they're able to behave this way."

She and her colleagues published their peerreviewed findings Feb. 6 in the journal *Royal Society Open Science*.

Aside from adding to our knowledge of the species' remarkable diving capability, the findings provide a baseline for controlled experiments, now underway at Duke, to study their reactions to low levels of sonar.

"It's important to understand their typical diving behavior in order to interpret the results of behavioral response studies," said Shearer, who conducts her research at the Duke University Marine Laboratory in Beaufort, N.C.

"These animals are fascinating and there is so much we still don't know about their behavior and physiology," Shearer said. "They are the world's deepest mammalian divers, but we don't yet understand how they dive to such extremes."

https://www.sciencedaily.com/releases/2019/02/190206 161440.htm



A Duke-led study sheds new light on the remarkable diving behaviors of Cuvier's beaked whales, the world's deepest-diving mammals. (Credit: Andrew J. Read).

FAR-RANGING FIN WHALES FIND YEAR-ROUND RESIDENCE IN GULF OF CALIFORNIA

Jan. 10, 2019 — Researchers from Mexico and the United States have concluded that a population of fin whales in the rich Gulf of California ecosystem may live there year-round -- an unusual circumstance for a whale species known to migrate across ocean basins.

What makes the discovery even more unusual, researchers note, is that they identified the pattern of movement of the fin whales, which are the second largest whale species in the world, using a satellite tracking data set from 2001. Oregon State University professor Bruce Mate, director of OSU's Marine Mammal Institute and co-author on the study, tagged 11 whales that year and was able to record the movements of nine of them for up to a year.

Since then, the OSU scientists have worked with colleagues in Mexico to further study the whales, in the process identifying via a 2011 photograph at least one female fin whale from the 2001 study -- this time, with a calf, indicating the whales may even stay in the region for breeding and calving.

Results of the study are being published today in the journal *PLOS ONE*.

"One reason we decided to go back to this data set is that we know very little about fin whales in this region," said Daniel Palacios, who holds the Endowed Faculty in Whale Habitats position at Oregon State's Marine Mammal Institute, and is co-author on the study. "It is fairly remote, it is not densely populated and it requires expensive technology to track whales over time."

"Researchers have known since at least the mid-1980s that fin whales inhabited the Gulf of California, but we just haven't been able to get much information about them. As it turns out, we had an important piece of the puzzle in the tracking data set we just hadn't yet fully analyzed."

The researchers were able to reach several conclusions, based on extensive analysis of the tracking record of the 2001 satellite telemetry data coupled with more recent observations of the region's weather patterns, acoustic data, and studies of potential food for the fin whales, in particular, krill and small fish.

• There may be as few as 100 or as many as 700 "resident" fin whales in the Gulf of California, with the best guess at around 600. Other migrating fin whales also may visit the region seasonally and intermix with the resident population;

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- The researchers believe the Gulf of California is a microcosm for what fin whales face in the larger ocean environment, where they may migrate for thousands of miles in search of the most productive food resources -- and possibly breeding and calving grounds.
- The fin whales in the Gulf of California may have everything they need in one location, though they are more likely to spend the warmer months in one part of the gulf and the cooler months in another -- likely in response to changes in prey abundance.

"The Gulf of California has a strong seasonal transition driven by changing atmospheric winds that produce upwelling and productivity," said OSU's Palacios, who specializes in the habitats of whale species. "Over the course of the seasons, different parts of the gulf light up and there are hot spots of productivity. Whales have learned to identify these areas and have adapted their movements to track this seasonal shift."

Fin whales are the second largest whale species in the world after blue whales. They are thought to reach as much as 80 feet in length and weigh up to 100 tons. Heavily hunted during the whaling era, their populations have slowly but steadily rebounded because of international protection and the fact that they consume fish as well as krill and other crustaceans.

As a reflection of this, the global conservation status of fin whales was recently upgraded from "endangered" to "vulnerable" by the International Union Conservation of Nature (IUCN) Red List.

Palacios said he hopes the Oregon State



A fin whale surfaces in Gulf of California, Mexico, during the 2001 study showing the characteristic black coloration of the body contrasting with the white lower right jaw. Photograph by Craig Hayslip, Oregon State University Marine Mammal Institute, under U.S. National Marine Fisheries Service Permit 369-1757 issued to Bruce Mate. (Credit: Craig Hayslip).

researchers and their colleagues from Mexico can return to the region and utilize newly developed tags that will be able to not only collect location data, but record how often the whales dive, how deep, and whether they are eating.

"Feeding year-round is what separates fin whales, blue whales and related species from other baleen whales," Palacios said. "We think they are finding enough food in the gulf to stay there year-round, but we'd like to document that over a period of years."

The study is important because marine mammals in the Gulf of California are threatened by illegal fishing and boating activity. One fish in particular -- the totoaba -- is illegally harvested by fishermen who sell the swim bladder in Asian markets as a supposed aphrodisiac.

In addition to threatening the fish population, the activity has had significant impact on the world's smallest and most endangered marine mammal -- the vaquita. A member of the porpoise family, its dwindling numbers are partially a result of bycatch from that illegal fishing. Some researchers estimate that only 30 vaquita remain alive in the gulf.

Finally, the ship traffic from illegal fishing in the gulf -- including illegal fishing and drug running -- may lead to increased risk of collisions with whales, which could threaten this population of fin whales, Palacios said.

"There is only one other place in the world that appears to have a resident population of fin whales, and that's in the Mediterranean," he said. "We'd like to find out more about how this unusual population has carved out its niche and what may define -- and threaten -- its success."

The OSU Marine Mammal Institute is headquartered at the university's Hatfield Marine Science Center in Newport, Oregon.

https://www.sciencedaily.com/releases/2019/01/190110 160938.htm

ANTARCTIC KRILL DECLINES AS SOUTH ATLANTIC OCEAN WARMS

by Tamara Dietrich

Feb. 2, 2019 — When biological oceanographer Deborah Steinberg bundles up and steps onto the deck of the Laurence M. Gould research vessel, this is what she sees: ice, ice and more ice.

"I see icebergs, I see sea ice, I see crabeater seals floating by on ice floes, the mountains of the Antarctic Peninsula," Steinberg said in a shipboard phone interview Friday. "It's gorgeous."

But it's what she can't see, what lies beneath the icy waters of the South Atlantic Ocean off

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northwestern Antarctica, that concerns Steinberg and an international team of marine researchers: krill.

Krill are small shrimp-like crustaceans that form a broad base of Antarctica's marine food web, nourishing the better-known charismatic megafauna such as fish, penguins, seals and whales.

They also play a major role in the "biological pump" that moves carbon dioxide from the atmosphere down into the deep ocean, preventing it from adding to global warming.

Now a new analysis of 90 years of scientific catch data by Steinberg, a professor at the Virginia Institute of Marine Science, in an international collaboration shows that krill have receded nearly 300 miles southward in their geographic range.

The reason is simple: The cold waters they need to thrive are warming up.

"Antarctic krill are adapted to the cold," Steinberg says. "Due to global warming, the habitat they can survive in has shrunk and moved farther southward, where waters are still chilly enough."

In the study area — a region of the Southern Ocean called the Scotia Sea — surface temperatures rose by 1.6 degrees F in the winter and 3.6 degrees F in the summer between 1925 and 2006.

Not only is the krill's range contracting, so is its population as fewer juveniles are surviving their new, unfavorable habitat.

"The northern waters have warmed and conditions throughout the Scotia Sea have become more hostile, with stronger winds, warmer weather and less ice," Simeon Hill of the British Antarctic Survey said in a statement. "This is bad news for young krill."

Ironically, with fewer younger and smaller krill around, the mean body length of krill actually has increased.

"Individuals in the current krill population average 6 millimeters longer than those in the 1970s," said



Biological oceanography Deborah Steinberg holds Antarctic krill. A new study shows the range and population of this key species are shrinking. (Credit: Tricia Thibodeau / VIMS (/ HANDOUT).



Angus Atkinson of the Plymouth Marine Laboratory in the U.K. "That's about a 75 percent increase in their mean body mass."

Atkinson and Hill are lead authors of a paper on these findings just published in the scientific journal "Nature Climate Change." Steinberg also is a coauthor.

The analysis was conducted by an international team of scientists from the U.S, the United Kingdom, Canada and Germany, and draws on a unique dataset called KRILLBASE.

This dataset was compiled over several years by many of the same scientists who authored the paper. It was informed by 15,194 scientific net tows between 1926 and 2016, and data from 11,000 sampling stations during 47 seasons between 1926 and 2014, according to VIMS.

It also incorporates information from old notebooks, published reports and submissions from researchers and commercial netters.

"This is a nice example of international cooperation in Antarctica," Atkinson said. "It's only when we put all our data together that we can look at the large scales of space and time to learn how populations of key polar species are responding to rapid climate change."

Ten years ago, Steinberg joined the Palmer Long-Term Ecological Research program, funded through the National Science Foundation, and since then has gone on research expeditions nearly every year. This year's mission began in late December and will conclude Feb. 14.

But she first visited the Antarctic three decades ago as an undergraduate, and has witnessed the rapid change firsthand.

"Palmer Station, which is the U.S. Antarctic research station that we visit each time we come on this annual cruise, has a glacier behind it," Steinberg

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said. "When I was 21, the glacier came very close to the station. And now when I visit Palmer, I see how much that glacier has retreated due to warming.

"It makes me concerned because, in the grand scheme of things, (this) is not a lot of time."

The krill's receding range has implications for the commercial krill fishery, and also for the marine creatures who rely on it as a prime food source.

Over time, said Steinberg, the megafauna also may migrate farther south along with their shrinking food source. But there is a limit.

"The population of krill can only contract so far, because there's a continent right there," she said. "It's not like the Arctic, where that's ocean — there's a continent. At some point, if warming continues, they will run out of habitat."

Decades after her first visit to Antarctica as an undergrad, Steinberg is bringing a new crop of undergraduate and graduate students to study the region. This year, for the first time, it includes her son, Samuel Malmquist, 20 and an undergraduate at Virginia Commonwealth University in Richmond.

Polar research like theirs can help policymakers in their decisions over how to respond to rapid changes in the region.

"The polar ocean is very, very sensitive to the climate warming, because the species there are precisely adapted to live at these cold temperatures," Steinberg said. "It's very important to use these longterm datasets to be able to learn how they're being affected.

"This is such an amazing and special environment here. It's like the last frontier. It is the most untouched-by-humans place on our planet, really. And I think it's very important to maintain these ecosystems for our planet and for generations to come."

https://www.dailypress.com/news/science/dp-nws-vimskrill-study-20190201-story,amp.html

INDUSTRIAL FISHING USHERS THE ALBATROSS CLOSER TO EXTINCTION, SAY RESEARCHERS

by Karen McVeigh

Jan. 31, 2019 — Industrial fishing vessels that accidentally kill tens of thousands of albatrosses each year routinely ignore regulations designed to save the birds from extinction, according to research.

Using satellite data, investigators found that vessels employing longline fishing techniques showed a "low level of compliance" with measures to reduce albatross deaths.

Longliners target tuna and other species, but their fishing lines – which can be up to 80 miles long – also unintentionally trap, drown and harm seabirds, as well as turtles, dolphins and other marine life, a process known as "bycatch".

Modern fishing methods have been identified as a major danger to plummeting albatross populations, threatening to drive almost three-quarters of all species to extinction, said Birdlife International, who undertook the research in conjunction with Global Fishing Watch.

Under a red list compiled by the International Union for Conservation of Nature, 15 out of 22 albatross species are considered endangered.

The study, which drew on satellite data to map the behaviour of longliners in the Indian, Atlantic and western central Pacific ocean, revealed that just 15% of the vessels used a measure known as "nightsetting", which involves putting lines down at night. The technique is one of three mitigation measures designed to protect albatrosses, which only feed during the day.

The findings offered a stark contrast with reports given by countries to fisheries watchdogs that suggested night-setting was used by between 29% and 85% of fleets.

"The results are very disappointing," said Stephanie Winnard, a biologist with the albatross task force, a specialist unit set up by Birdlife International and the Royal Society for the Protection of Birds. "By this stage you would expect a lot more vessels to be using night setting."

The aim of the research was to encourage best practice, to which end the results will be shared with the countries whose vessels were studied.

Albatrosses, petrels and other seabirds are "irresistibly drawn" to the trailing, baited longlines, said Winnard. Each year, an estimated 100,000 birds are hooked and drowned by longline and trawl fisheries.

"This level of bycatch in the fishing industry is hugely unsustainable for birds that can take up to 10 years to start breeding," said Winnard, who added that the findings were "truly powerful" for the way the data shed light into the "opaque world" of global fisheries and their impact on ocean biodiversity.

"No one is going to report they are not sticking to the rules or they are killing seabirds, so we now have this independent way of measuring compliance," said Winnard. "This information has never before been public. It is usually kept behind closed doors. It will promote transparency and hold countries to account. It

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is the first time we've been able to see what is happening on individual fishing boats."

The researchers used vessels' satellite data to examine the way 201 ships were moving, as well as the speed and direction of travel, in order to determine when fishing lines would be put down.

Regulations laid down by the five Regional Fisheries Management Organisations that regulate tuna fisheries where albatross are found generally stipulate that two out of three mitigation measures must be used. The other methods include weighting lines to ensure they sink faster and using streamer lines to scare seabirds away. The regulations have been in place for between five and 10 years, depending on the region, but the RFMO rely on selfreporting by the ships.

However, the international Agreement on the Conservation of Albatrosses and Petrels, introduced in 2004, suggests all three mitigation methods should be used.

A study published in 2011 estimated the bycatch of seabirds of longline fisheries to be between 160,000 and 320,000 annually.

https://www.theguardian.com/environment/2019/jan/31/ industrial-fishing-ushers-albatross-closer-to-extinctionsay-researchers

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)		
1/31 10 am	30 80	Gray Whales Risso's Dolphins (breaching)		
1/30 3 pm	12	Gray Whales		
1/30 9 am	31 60	Gray Whales Risso's Dolphins		
1/29 11 am	38	Gray Whales		
1/28 3 pm	35	Gray Whales		
1/28 11 am	37 12	Gray Whales Risso's Dolphins		
1/28 9 am	55	Gray Whales		
1/27 3 pm	17	Gray Whales		
1/27 1 pm	45	Gray Whales		
1/27 11 am	51	Gray Whales		
1/27 10 am	35	Gray Whales (breaching and tail throws)		
1/27 9 am	51	Gray Whales		
1/26 3pm	34	Gray Whales (fluking, spouting)		

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		<u> </u>		
1/26 1 pm	31	Gray Whales		
		Crew Whales		
1/26 11 am	58	Gray whates		
	22	Risso's Dolphins (mating)		
1/26 9 am	39	Gray Whales		
1/25.2	5	Bottlenose Dolphins		
1/25 3 pm	25	Gray Whales (breaching)		
1/25 10 am	41	Gray Whales		
1,20 To uni	80	Risso's Dolphins (breaching)		
1/25 9 am	44	Gray Whales		
1/25 9 am	100	Risso's Dolphins		
1/24 11.30 am	25	Gray Whales		
1/24 11.30 am	2	Bottlenose Dolphins		
1/24 9 am	38	Gray Whales		
1/23 3 pm	16	Gray Whales		
1/23 11 am	13	Grav Whales		
1/22 3 nm	16	Gray Whales		
1/22 5 pm	10	Crew Whales		
1/22 11 am	0	Diay whates Bottlonggo Dolphin		
1/22.0	1			
1/22 9 am	12	Gray Whales (breaching)		
1/21 10 am	12	Gray Whales		
1/20 11 am	15	Gray Whales (fluking and		
1/20 11 um	15	traveling)		
1/20 9 am	16	Gray Whales		
1/19 3 pm	7	Gray Whales		
	10	Gray Whales		
1/19 2 pm	12	Risso's Dolphins		
*	2	Harbor Porpoise		
1/10.11	4	Gray Whales		
1/19 11 am	20	Risso's Dolphins (incl. Casper)		
1/10.0	10	Gray Whales		
1/19 9 am	50	Risso's Dolphins		
	29	Gray Whales		
1/19 9 am	120	Risso's Dolphins		
8 hour All Day	1	Albatross		
	5	Grav Whales		
1/18 3 pm	100	Risso's Dolphins (incl. Casper)		
1/18 10 am	15	Grav Whales		
1/10 10 alli	0	Cray Whales		
	0 20	Desific White sided Delphing		
1/15 9 am	50	Place footed Albetroop		
	1	Eas Vally Jally Sah		
	1	Egg York Jenyinsh		
1/14 9 am	8	Gray whates		
	3	Egg Yolk Jellyfish		
1/13 3 pm	5	Gray Whales		
- r	50	Risso's Dolphins		
	11	Gray Whales		
1/13 11 am	275	Risso's Dolphins (breaching, tail		
		slaps, head slaps, and mating)		
	4	Gray Whales		
1/12 9 am	1	Humpback Whale		
	1	Black-footed Albatross		
1/11.0 cm	11	Gray Whales		
1/11 9 am	10	Risso's Dolphins		
1/10.0	6	Gray Whales		
1/10 9 am	30	Risso's Dolphins		
1/8 9 am	4	Gray Whales		
	Gray Whales			
1/7 9 am	30	Risso's Dolphins		
	1	Egg Yolk Jellvfish		
	-	00		

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



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MONTEREY COUNTY HOTLINES for Marine Mammals

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Membership Levels and Annual Dues						
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