Soundings

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

OCTOBER 2016

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, October 27, 2016
Time: 7:30 PM
PLEASE JOIN US AT 7:00 FOR REFRESHMENTS

Speaker: **Bill Standley**
Title: The California Coastal National Monument: Past, Present, and Future

Bill is the Natural Resource Specialist for the Bureau of Land Management's (BLM) California Coastal National Monument, based in BLM's Central Coast Field Office in Marina. The California Coastal National Monument is made up of 20,000 rocks and islands and currently one on-shore area. Designated in 2000 by President Bill Clinton, the monument is managed by the BLM with cooperation from community groups up and down the state.

Bill grew up in Phoenix, Arizona, but has spent most of his adult life in California. He got a bachelor's degree in biology from UC Santa Cruz and a master's degree in wildlife biology from the University of Arizona. Bill has worked with threatened and endangered species throughout the west and spent 10 years working in Hawaii working to, among other things, reduce seabird collisions with powerlines, mostly on the island of Kauai. Before moving to Monterey to work for the Coastal Monument just under 3 months ago, Bill was working for the US Fish and Wildlife Service in their Ventura Field Office working with California least tern and western snowy plover.

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

Next month: Our November and December meetings are combined because of the seasonal holidays, so our final program this year will be on Thursday, Dec. 1. Our speaker will be photographer Chris Hartzell.

INSIDE THIS ISSUE

Risso's dolphin on September 11, 2016. (Credit: Daniel Bianchetta).

CALENDAR

Nov. 4: Hopkins Marine Station Marine Science Lecture from noon to 1 PM. Lecture by Paolo Domenici: Animal Escapology: When, why and how to escape from predators.

Nov. 6: Pacific Grove Museum of Natural History lecture by Dr. Beth Shapiro: How To Clone A Mammoth. 3 PM – 4:30 PM.

Nov. 10-13: Western Society of Naturalists 97th Annual Meeting in Monterey, CA. The 100th Anniversary of the Society will be held at the Hyatt Regency Monterey Hotel and Spa. For more information go to www.wsn-online.org.

Nov. 11: American Cetacean Society's Whale Watch Conference Fundraiser. This all day (8 AM – 4 PM) whale watch will take place on the 75' Catamaran *BlackFin*, owned and operated by Monterey Bay Whale Watch. California's pre-eminent killer whale experts Nancy Black and Alisa Shulman Janiger will be naturalists on this all-day expedition. The trip's objective will be to observe Monterey Bay's biodiverse marine mammal assemblage including killer whales, blue whales, humpback whales and numerous dolphin species. For more info please call Monterey Bay Whale Watch at 831-375-4658 or Tony Lorenz at 831-901-7259.

Dec. 1: Moss Landing Marine Labs Seminar at 4 PM in the Moss Landing Seminar Room. Seminar led by Charles Boch of Moss Landing Marine Labs: Climate change and abalone life history.

Dec. 2: Hopkins Marine Station Marine Science Lecture from noon to 1 PM. Lecture by Brigitte McDonald of Moss Landing Marine Labs: Pushing the Limit: Diving physiology and energetics of marine mammals.

Dec. 8: Moss Landing Marine Labs Seminar at 4 PM in the Moss Landing Seminar Room. Seminar led by Mark Carr of UC Santa Cruz: Causes and consequences of geographic patterns of kelp forest community structure.

American Cetacean Society
15th International Conference

Fifty Years of Whale Conservation: Reflections and Innovations

November 11-13, 2016

ACS invites you to join a unique gathering of scientists, policy makers, and conservationists from all over the world. The amazing Saturday and Sunday program includes experts in cetacean Conservation, Research and Education. And don't forget the book signings, art show, silent auction, marine life photo contest, research poster contest, and Friday's pre-conference whale watching trip.

Full conference, single day, and half day registrations available.

Full conference registration tickets include Friday night reception, all plenary sessions, panels, poster sessions, book signings, silent auction, and lunch on both Saturday & Sunday.

Member, non-member, and student rates available.

Register at:
http://www.eventbrite.com/e/american-cetacean-societys-15th-international-conference-november-11-13-2016-registration-25946461565?aff=ebapi

This conference is being dedicated to Captain, Biologist, Naturalist, and eternal friend of the ACS Monterey Bay Chapter, Richard Ternullo.

Unique Feeding Habits of Whales Revealed

Sep. 22, 2016 — Whales are the biggest animals to ever have existed on Earth, and yet some subsist on creatures the size of a paper clip. It's a relatively common factoid, but, in truth, how they do this is only just being uncovered, thanks to new technologies.

What scientists do know is that a 160-ton blue whale's method for scooping krill is a tremendous endeavor. Swimming around 4 meters per second, it opens its triple-hinged jaws and takes in a gulp equal to about 140 percent of its mass, slowing back down to filter its snack and prepare for the next one. Blue whales feed nearly continuously when prey conditions are good during the feeding season, but for biologists, the exact mechanism remains a confounding feat of gigantic proportions.

By attaching new sensor technology to whales just before they dive, researchers from Stanford's Hopkins Marine Station have captured this energetically expensive activity in more detail than ever before, which they report now in *Current Biology*.

Lunging for dinner

This type of feeding, called lunge feeding, is unique to rorquals, a family of baleen whales that includes blue whales, humpbacks and minke whales. Having a precise understanding of this process gives us some clues as to how these massive animals survive on such tiny prey, which in turn will help biologists develop more effective conservation efforts.

"This feeding process is facilitated by a complex suite of biomechanical and anatomical adaptations that together allow the whales to engulf a volume of water and prey that is larger than their own body," said co-author Jeremy Goldbogen, assistant professor of biology at Stanford. "For a large blue whale, this represents a volume of water and prey that is approximately the size of a large swimming pool or a school bus, and this is engulfed in a matter of seconds."

To gulp down a mouthful of krill or fish, rorquals have to time their lunge just right. The enormous intake slows them down rapidly due to the drag caused by opening their mouths and the added burden of the water they take in.

Performing this behavior at deep depths can make it even more energetically costly.

"When these animals dive down to 300 meters, holding their breath for 12 minutes or more, they had better be sure it's worth the cost," said David Cade, lead author and PhD student in biology at Stanford. "To regain the energy lost, the prediction is that they are foraging on a pretty dense, rich resource."

New whale-top view

Sensors that record multiple facets of whale life have been around for about 15 years. Goldbogen has used them to study the reactions of blue whales to cargo ships and the lunge frequency of minke whales. These suction cup sensors can include a combination of accelerometers, magnetometers, and pressure and sound recorders.

With this equipment, researchers can tell how the whales move in three dimensions but finer details are lost. For example, in 2006 research, Goldbogen hypothesized that whales open their mouths at peak speed when lunge feeding. A competing theory later said their mouths open several seconds before the peak in speed, yet neither theory could be tested with the sensors available at the time.

To figure out which model of feeding was more accurate, Stanford researchers worked with other whale researchers and engineers to develop a sensor package that housed miniaturized versions of typical movement technology plus new video recording capabilities. They attached these tags to whales in South Africa, Patagonia, and off the west and east coasts of the United States. The resulting video is what you would see if you were riding on the whale's back.

"Combining these two modalities is really eye-opening," said Cade. "Every time we do a deployment, we get something back that's new and interesting."

The researchers found that whales that fed on krill followed a distinct pattern of activity. As Goldbogen hypothesized, they opened their mouth at peak speed and closed it around the time they were back to normal speed. Humpbacks that fed on fish, however,

Researchers from Stanford's Hopkins Marine Station attach devices that enable them to watch a whale's behavior as though they were riding on the animal's back. (Credit: Jeremy Goldbogen).

varied their timing. This is likely in response to the more advanced escape abilities of fish compared to krill; the whales may be performing lunge feeding that is less energetically ideal when the trade-off is eating prey that can supply them with more energy.

Save the whales … and the fish

Effective Oct. 11, most populations of humpback whales will be removed from the endangered species list. Even accounting for that change, three of the eight species of rorquals are endangered. There is insufficient data to determine the status for three other species in this family. Any attempt to ensure the survival of these giants will require us to know much more about them, including the particulars of their mealtime activities.

"Because they operate on an energetic knife-edge, any changes in the environment related to their food supply could have profound impacts on individual and population health," said Goldbogen.

This research could also help us better determine the impact whales have on our ocean resources. Whales have previously been blamed for reduction in fish populations but, although there are estimates, we don't actually know how much a whale eats, said Cade.

These predators have played important roles in our ecosystem for millions of years, and the mass removal of them has had a poorly understood effect on ocean ecology as a whole. Learning more about rorqual feeding habits can support conservation efforts while also furthering insights into ecosystem processes that have direct effects on human fisheries. As for their part, the Hopkins researchers hope to dive deeper into whale feeding studies, including figuring out the fluid mechanics of their iconic baleen, which acts as a high-throughput filter to process the vast amounts of small prey.

Additional authors on this paper include Ari S. Friedlaender of Oregon State University and John Calambokidis of Cascadia Research Collective. The study, titled "Kinematic Diversity in Rorqual Whale Feeding Mechanisms," is published in *Current Biology*.

https://www.sciencedaily.com/releases/2016/09/160922143816.htm

Whales Might Be Hidden, but These New Buoys Can Help Find Them

Sep. 14, 2016 — How do you find whales that dive so deep and spend so little time at the surface that some species have never been observed alive? Sometimes you just have to listen closely.

Blainville's beaked whale. (Credit: John Durban, NOAA Southwest Fisheries Science Center/Bahamas Marine Mammal Research Organization).

Thanks to a newly developed system of drifting buoys, scientists from NOAA's Southwest Fisheries Science Center in La Jolla, Calif., will have a much better chance of hearing beaked whales in their deep water habitat off the West Coast.

About 20 buoys will be deployed from NOAA Ship Bell M. Shimada, each with a listening device suspended 330 feet below the ocean surface to record the whales' vocalizations. Over the 20-day deployment, each buoy is expected to drift as much as 10 nautical miles per day and cover 100 to 200 miles over the course of the survey.

The new technology used for the drift buoys has cost-saving benefits, too. "The great advantage of the buoys is that their collective 400 days at sea is like increasing our ship effort by a factor of 10 with very little increase in cost," says Jay Barlow, co-chief scientist of the survey.

Paired with listening devices towed behind the ship and a visual observing team onboard, this survey should provide valuable new data about a group of whales considered to be in decline in the California Current. NOAA scientists estimated that one of the better known species of beaked whales, Cuvier's beaked whales, declined from more than 10,700 individuals in 1981 to 7,500 in 2008.

The cause of the decline remains a mystery. Scientists say potential culprits could be shifting population distributions, changes in the deep-water food web or human impacts such as increasing ocean noise. The data on beaked whale abundance, distribution and vocalization patterns gathered during this research survey will help scientists understand these mysterious whales of the deep, so NOAA and partners can work to protect them -- even if we can't see them.

https://www.sciencedaily.com/releases/2016/09/160914135310.htm

Deepwater Horizon Oil Spill Impacted Bluefin Tuna Spawning Habitat in Gulf of Mexico, Stanford and NOAA Researchers Find

Sep. 30, 2016 — The Deepwater Horizon oil spill was one of the largest environmental disasters in history, releasing roughly 4 million barrels of crude oil into the Gulf of Mexico. For Atlantic bluefin tuna, it occurred at the worst time of year, during peak spawning season, when eggs and larval fish that are particularly vulnerable to environmental stressors exist in mass quantity.

In a study published in *Nature: Scientific Reports*, scientists from Stanford and NOAA provide the best yet analysis of how the 2010 breeding season might have been impacted by the oil spill.

Although the spill encompassed a relatively small proportion of the bluefin tuna spawning grounds, which extend throughout the northern Gulf of Mexico, the authors showed the cumulative oiled tuna habitat was roughly 3.1 million square miles, representing the potential for a significant impact on eggs and larval bluefin tuna in the Gulf of Mexico.

The authors concluded that the spill impacts combined with the multiple stressors of ocean warming and fishing pressure could make it more difficult for this unique population to rebuild.

"We know that bluefin tuna face numerous threats in the Gulf of Mexico and the oil spill represents another potential impact during a critical portion of their life history," said Elliott Hazen of NOAA Fisheries' Southwest Fisheries Science Center in La Jolla, California, and first author of the study.

The scientists directly mapped the preferred spawning habitat of the Atlantic bluefin tuna by drawing from a 16-year data set of electronic tagging data from 66 fish, which provided information such as the animals' locations, temperatures and unique diving patterns after up to a year of being tracked on sojourns of thousands of miles. They then overlaid this data with satellite observations of the oil spill's reach, to map the potential impact.

"It took us many years to establish and perfect the techniques of putting a satellite tag, essentially a small computer, on giant bluefin tuna, many over 1,000 pounds in this study, and figure out exactly where and when they potentially spawn in the Gulf of Mexico," said study co-author Barbara A. Block, a professor of marine sciences at Stanford. Block led the effort to discern exactly where and when the bluefin spawn.

Researchers tag a 1,000-pound giant bluefin tuna off Port Hood, Nova Scotia. (Credit: TAG A Giant).

They found that the timing of the oil spill directly overlapped with the maximum extent of adult bluefin tuna foraging and spawning habitat in the Gulf of Mexico. At its peak in May 2010, the spill covered more than 5 percent of the spawning habitat of Atlantic bluefin tuna in the U.S. Exclusive Economic Zone.

Exposure to oil has previously been shown to have physiological consequences to the heart, and can cause deformations and death in eggs and larval fish, making it crucial to understand the effects in order to assess the impacts of oil spills. The effect of oil on spawning adult fish is not as well understood but the crude oil may add stressors to all life history stages occurring in the Gulf of Mexico.

"The bluefin tuna population in the Gulf of Mexico has been struggling to rebuild to healthy levels for over 30 years," Block said. "These fish are a

genetically unique population, and thus stressors such as the Deepwater Horizon oil spill, even if minor, may have population-level effects. It is difficult to measure recruitment from the Gulf of Mexico post-2010, as the fish take a long time to enter into the commercial fishery where monitoring occurs, so we remain concerned."

The researchers said that their results are only inferring that the Deepwater Horizon spill likely harmed a sliver of the spawning habitats, and thus at least some of the 2010 class of bluefin tuna, but further monitoring is needed to understand how that affects the population at large.

"Because of their economic and ecological importance, we need to ensure the conservation and protection of Atlantic bluefin tuna on their spawning grounds," Hazen said. "We need to ensure maintained – if not increased – monitoring of Atlantic bluefin tuna in the years to come."

Additional co-authors of the research include Aaron B. Carlisle, James Ganong, Rob Schallert and Steve Wilson of Stanford; Michael J.W. Stokesbury of Acadia University; and Steven J. Bograd of NOAA Fisheries' Southwest Fisheries Science Center.

http://news.stanford.edu/press/view/10643

Sea Otter Survey Encouraging, but Comes Up Short of the "Perfect Story"

Sep. 19, 2016 — The southern sea otter, *Enhydra lutris nereis*, continues its climb toward recovery, according to the annual count released today by the U.S. Geological Survey and partners.

For the first time, southern sea otters' numbers have exceeded 3,090, which is the threshold that must be exceeded for three consecutive years in order for the U.S. Fish and Wildlife Service to consider removing the species from Endangered Species Act protections. However, localized population declines at the northern and southern ends of the range continue to be a cause for concern among resource management officials.

This year's survey results suggest an increasing trend over the last five years of more than 3 percent per year. The population index, a statistical representation of the entire population calculated as the three-year running average of census counts, has climbed to 3,272, up from 2,939 in 2013. The growth is accounted for by an unexpected jump in numbers in the center of the sea otter's range, an area that spans the Californian coast from Monterey south to Cambria.

"We believe the high count this year is partly explained by excellent viewing conditions, but it also appears to reflect increased food availability in the range center," says Dr. Tim Tinker, a research ecologist who leads the USGS sea otter research program. "The boom in sea urchin abundance throughout northern and central California has provided a prey bonanza for sea otters, and that means more pups and juveniles are surviving to adulthood."

While the overall population index continues to trend upward, the northern and southern subsets of the population continue a negative five-year decline, dropping 2.5 percent and 0.6 percent per year. "We are still seeing large numbers of stranded otters near the range peripheries, a high percentage of which have lethal shark bite wounds," says Mike Harris, a biologist with the California Department of Fish and Wildlife. "These deaths may explain the lack of population growth in those areas."

Declines at the range ends have implications for the long term outlook for sea otter recovery. "Negative population trends at the edges of the range are probably responsible for the lack of range expansion over the last decade," explained Tinker. "These are the portions of the population that typically fuel the colonization of new habitats."

In addition to the sea otter population along the mainland coast, the USGS also surveys the subpopulation at San Nicolas Island in the southern California Bight. This population, established by translocation in the late 1980s, struggled at low numbers through the 1990s, but over the last decade has been growing rapidly with a mean growth rate of 13 percent per year. "The sea otters at San Nicolas Island continue to thrive, and some may eventually emigrate to and colonize other Channel Islands in southern California," says Brian Hatfield, the USGS biologist who coordinates the annual census.

Since the 1980s, USGS scientists have computed the annual population index and evaluated trends in the southern sea otter. For southern sea otters to be considered for removal from threatened species listing under the Endangered Species Act, the population index would have to exceed 3,090 for three consecutive years, according to the threshold established under the Southern Sea Otter Recovery Plan by the USFWS. To reach the optimum sustainable population level under the Marine Mammal Protection Act, which is the number of animals that will result in the maximum productivity of the population while considering carrying capacity and ecosystem health, the southern sea otter

population would likely have to reach as many as 8,400 animals in California.

"The population index has exceeded 3,090 for the first time, and that's encouraging," said Lilian Carswell, Southern Sea Otter Recovery Coordinator for USFWS, "but sustained population growth will require range expansion, which means that sea otters will somehow have to get past the shark gauntlets near the ends of the current range. Over the longer term, it's not just sea otter numbers we're after, but the restoration of ecological relationships in the ecosystems where sea otters and other nearshore species coevolved."

The sea otter survey and stranding programs are just one part of a larger research program investigating sea otters and their role as predators in coastal ecosystems. In Elkhorn Slough, located between Santa Cruz and Monterey, a recent study suggests that sea otters' appetite for crabs can improve the health of seagrass beds, and USGS scientists are collaborating with biologists from the Monterey Bay Aquarium, the Elkhorn Slough National Estuarine Research Reserve, University of California, Santa Cruz and the CDFW to study the population in this unique habitat. A new study from UCSC, USGS and the Monterey Bay Aquarium is investigating how sea otters near Monterey are responding to the increase in sea urchins, which may be in part a result of loss of predatory sea stars from wasting disease. The scientists are studying whether sea otters play a key role in preventing urchins from overgrazing kelp forests in the absence of sea stars.

Survey Methodology

- The annual population index is calculated from visual surveys conducted via telescope observations from shore and via low-flying aircraft along the California coastline by researchers, students and volunteers from USGS, CDFW's Office of Spill Prevention and Response, Monterey Bay Aquarium, UCSC, USFWS and U.S. Bureau of Ocean Energy Management.
- This year, the surveyed coastline spanned from Pillar Point in San Mateo County, south to Rincon Point near the Santa Barbara/Ventura County line, and also included San Nicolas Island.

Sea Otter Facts

- Sea otters were presumed extinct in California after the fur trade years, but were rediscovered in the 1930s, when about 50 animals were documented persisting near Bixby Creek north of Big Sur.
- Sea otters are considered a keystone species of rocky sub-tidal ecosystems because they prey on sea urchins that, if left unchecked, can decimate kelp beds.
- Scientists also study sea otters as an indicator of nearshore ecosystem health, since sea otters feed and live near the coast and often are the first predators exposed to pollutants and pathogens washed down from coastlands, such as the microbial toxin microcystin.
- The public can report sightings of stranded sea otters to institutions listed at http://www.werc.usgs.gov/ProjectSubWebPage.aspx?SubWebPageID=5&ProjectID=232.

More detailed survey results and maps are available in the full report "Spring 2016 California Sea Otter Census Results," which is available online.

https://www.usgs.gov/news/Spring2016CaliforniaSeaOtterCensusRelease

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)
9/30 9 am	3 2 10	Humpback Whales Bottlenose Dolphins Harbor Porpoise
9/30 8 am	4 30 8 13	Humpback Whales Risso's Dolphins Bottlenose Dolphins Harbor Porpoise
9/28 2 pm	1 30-40	Humpback Whale Risso's Dolphins
9/28 12:30 pm	1 50	Humpback Whales Risso's Dolpins
9/28 9 am	3 50-60	Humpback Whales Risso's Dolphins
9/28 8 am	3 70	Humpback Whales Risso's Dolphins
9/27 2 pm	5 30	Humpback Whales Risso's Dolphins
9/27 9 am	12 200	Humpback Whales Risso's Dolphins
9/27 8 am	8 12 100	Humpback Whales Pacific White-sided Dolphins Risso's Dolphins
9/26 2 pm	7 50	Humpback Whales Risso's Dolphins
9/26 9 am	33 350 100 75 1	Humpback Whales Long-beaked Common Dolphins Pacific White-sided Dolphins Risso's Dolphins Mola Mola (Ocean Sunfish)

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Membership Levels and Annual Dues

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