Soundings

AMERICAN CETACEAN SOCIETY
Monterey Bay Chapter

MAY 2016

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, May 26, 2016
Time: 7:30 PM
PLEASE JOIN US AT 7:00 FOR REFRESHMENTS

Speaker: **Mauricio Alvarez**
Expedition Director on the *Stella Australis*

Mauricio (on right in photo) was born in Punta Arenas, Chile in 1968 and completed his high school studies and learned English in Washington, USA. He studied Engineering and Cinematography in Santiago de Chile.

His relationship with traveling, mountaineering, and photography began at an early age in the Torres del Paine National Park where he worked as a guide in the summers of the 1980s. Continuing with mountaineering and audiovisual production he went to Europe to form part of an alpinist group doing expeditions to the Pyrenees and Alps from 1995 to 2003. His enjoyment of the study and documentation of sites rich in natural history has brought him back to Patagonia.

In 2005 he joined the expedition team of *Australis* (www.australis.com) where he specializes in history and the photography of flora, also a musician and loves sports. He assists scientists from around the world in their studies of near Antarctic waters. He has contributed to many papers regarding marine biology of the Cape Horn region of South America.

He is an A.C.A. level-2 certified kayaker and is fluent in Spanish and English. Among other subjects, Mauricio will talk with us about Antarctic whales and elephant seals.

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

Next month: Join us for our June meeting and presentation at 7:30 PM on Thursday, June 30.

INSIDE THIS ISSUE

Killer Whales by the Monterey Bay Aquarium on April 23, 2016. (Credit: Daniel Bianchetta).

CALENDAR

May 27: 22nd Annual Lawrence R. Blinks Memorial Lecture at Hopkins Marine Station Boat Works Hall: by Peter T. Madsen of Aarhus University: "Toothed Whale Biosonar in the Wild: An Echoic Search for Prey in a World of Darkness." 12 noon to 1 PM.

Jun. 3: Seminar at Hopkins Marine Station Boat Works Hall by Jody Beers, Stanford University: "Integrative Physiology in the Anthropocene: Examples from the California Coast." 12 noon to 1 PM.

Jul. 11-17: Summer Course at Moss Landing Marine Labs: "BIO 347, Working with Marine Mammals." 9:30 AM to 5:30 PM each day. This class will be taught by Dr. Jenifer Zelligs. For more information please email the instructor at jzeligs@csumb.edu.

Oct. 3-7: 9th Annual California Islands Symposium at the Marriot Beach Hotel in Ventura, CA. This symposium will present the most recent scientific findings on the Channel Islands and islands off the west coast of Baja California. All day field trips will be scheduled to the Channel Islands with Island Packers in Ventura, CA. For more information go to www.mednscience.org/CaliforniaIslandsSymposia

Nov. 11-13: American Cetacean Society's Biennial Meeting at the Embassy Suites in Monterey, CA. This conference will bring together some of the world's pre-eminent marine mammal scientists for a three day symposium in one of the world's most bio-diverse cetacean hotspots. This conference will also offer an all day whale watching trip on Friday, November 11 with Monterey Bay Whale Watch.

BOOK RECOMMENDATIONS

The Shark and the Albatross: Travels with a Camera to the Ends of the Earth, by John Aitchison. 2015 Profile Books Ltd.

The Naturalist: Theodore Roosevelt, A Lifetime of Exploration, And Triumph Of American Natural History, by Darrin Lunde. 2016 Crown.

American Cetacean Society
Monterey Bay Chapter

Annual Summer Whale Watching Fundraiser

Saturday, June 25, 2016

10:00 am – 3:00 pm

This annual fundraiser will explore the marine mammal rich waters of Monterey Bay in search of Blue and Humpback Whales.

Humpback Whales have been seen daily for weeks and Blue Whales have already been observed on several occasions in both March and April of this young feeding season.

We will also be on the lookout for Fin Whales, Killer Whales, and various species of dolphin.

Cost: $60

Boat: 70' Sea Wolf 2

For reservations please call 831-375-4658

ANTARCTIC WHALES AND THE KRILL THEY EAT

May 9, 2016 — The Western Antarctic sector of the Southern Ocean is the regular feeding ground of a large number of fin and humpback whales of the Southern Hemisphere. Around 5,000 fin whales likely migrate to its ice-free waters during summer, along with at least 3,000 humpback whales. These estimates follow a ship-based helicopter survey of whales in Antarctic waters. A net trawl survey for krill* was also conducted to see if the distribution of these whales and specific krill species are connected. The study was led by Helena Herr of the University of Veterinary Medicine Hannover in Germany, and is published in a special issue on "Antarctic Peninsula Shelf Biology" in Springer's journal *Polar Biology*.

Herr's team produced distribution maps that predict the densities in which humpback (*Megaptera novaeangliae*) and fin whales (*Balaenoptera physalus*) likely occur in the Bransfield Strait and Drake Passage. It was found that the two whale species do not share the same habitat or feeding grounds around the West Antarctic Peninsula. An estimated 3,024 humpback whales frequented the coastal parts of the Bransfield Strait in summer 2013,

while at least 4,898 endangered fin whales were found along the shelf edge in the Drake Passage.

The krill survey shows that *Euphausia superba* is the most widely distributed and abundant source of food available to whales in the area. The krill type Euphausia crystallorophias occurs sporadically in smaller numbers near the coast, and Thysanoessa macrura generally beyond the shelf edge.

The relationship between whales and the krill they feed on is not a simple one. At the time of the survey, fin whales fed in an area dominated by Thysanoessa macrura. They are also known to feed on *Euphausia superba*. Fin whales therefore seem to opportunistically feed on whatever prey aggregates around the shelf edge.

There isn't a clear relationship between humpback whales and the presence of a particular krill species either. The whales seemed to be located in all areas of the Bransfield Strait regardless of how much krill was available. Humpback whales did however tend to occur in sectors with at least a medium concentration of *Euphausia superba*. Humpback whales seem to have adopted migration patterns and foraging strategies that lead them to areas likely to provide, on average, sufficient amounts of prey.

"In the light of increasing effort by the commercial krill fishery and climate change-related effects on krill biomass, dedicated surveys that target both krill and their main predators, such as baleen whales, need to be undertaken concurrently. This is to monitor and ensure that habitats in the Southern Ocean will continue to support a humpback whale population that has just touched pre-exploitation numbers," says Herr.

Efforts should also be strengthened to investigate the ecology and feeding strategies of endangered Southern Hemisphere fin whales, since little is known about their connection to and dependency on local prey stocks.

* Krill are small crustaceans that feed on plankton. They are the main prey of baleen whales, which lack teeth, but have baleen to filter krill out of seawater.

https://www.sciencedaily.com/releases/2016/05/160509115731.htm

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Scientists Establish First Map of the Sea Lion Brain

Apr. 27, 2016 — Rio is a California sea lion who can solve IQ tests that many people have trouble passing. In fact, she is so smart that scientists at the Long Marine Lab at the University of California, Santa Cruz designed a series of tests that prove she is the first animal besides humans that can use basic logic (If A=B and B=C then A=C).

Rio's display of intelligence is less surprising when you consider the fact that she is a member of one of only four groups of animals that have evolved extremely large brains (weighing more than 1.5 pounds). Along with seals and walruses, she is part of a group of fin-footed, semiaquatic marine mammals called pinnipeds. The other large-brained groups are humans, elephants and cetaceans (whales and dolphins).

Despite considerable evidence of their cerebral skills, very little is known about pinniped brains. However, a team of neuroscientists at Vanderbilt University has taken an important step toward rectifying this lack of knowledge by conducting the first comprehensive study of the California sea lion's central nervous system, concentrating on the somatosensory system, which is concerned with conscious perception of touch, pressure, pain, temperature, position and vibration.

Last year, the dramatic upsurge of juvenile California sea lion deaths due to strandings throughout central and southern California made it possible for Sawyer to obtain two juvenile sea lion brains for study. (Sea lions, like all marine mammals, are protected by the federal government under the Marine Mammal Protection Act of 1972.)

The results of their study are described in the paper "Somatosensory brain stem, thalamus and cortex of the California sea lion (Zalophus californianus)" published online in the early view of the Journal of Comparative Neurology.

"It was amazing to see the sea lion brain for the first time because, after spending years studying brains, it was shocking to see something so large and so different from any other brain I had ever worked with," said first author Eva Sawyer, a doctoral student in neuroscience at Vanderbilt. Fellow doctoral student Emily Turner collaborated in the study under the supervision of Jon Kaas, Gertrude Conaway Vanderbilt Professor in Social and Natural Sciences.

"We know a lot about how some brains are organized and function, mice and primate brains for example, but mammals are highly varied, and we know almost nothing about the brains of most mammals, including pinnipeds," said Kaas.

Humans, elephants, cetaceans and pinnipeds each evolved large brains independently, so the way that their brains are organized is quite different, particularly the cortex. Due to our inherent interest in our own evolution and the importance of the large human brain to our identity, it is worthwhile looking at these independent examples of how brains become large, Sawyer pointed out.

California sea lions have brains about the size of chimpanzees but they are organized much differently. (Credit: Eva Sawyer, Vanderbilt University).

Sea lion brains are about the same size as chimpanzee brains. Although they have some features in common with the brains of their closest relatives - dogs, cats, bears and weasels - their brains are also intensely folded in a fashion similar to that of whales and dolphins.

"It is striking that both cetaceans and pinnipeds tend to have large and convoluted brains, but there is no single accepted explanation for this observation," said Sawyer. "It is at least partially explained by their large body size. Animals with larger bodies are expected to have larger brains. But it may also be related to other factors, such as the weightlessness of the marine environment or coping with cold water temperatures. Or it could just be a random outcome of evolution."

The researchers focused on the sea lion's somatosensory system because they were particularly curious about the animal's sense of touch. "We have long wondered about how the somatosensory systems of sea lions and seals are organized, as they have such remarkable abilities to use touch and their whiskers to explore and feed in deep water," Kaas said.

Using modern histochemical methods, Sawyer and Turner were able to identify and characterize the major parts of the sea lion brain that are used in processing touch information from the whiskers and the skin. These include areas in the brainstem, thalamus and cortex.

They discovered that the marine mammal's brain has specific areas for processing information from its whiskers that are strikingly similar to those found in mice and rats, who are considered the whisker specialists in the animal kingdom. Specifically, they found that each whisker on the sea lion's nose has a specific, corresponding area in the brainstem devoted to it. These are comparable to specific areas on the human brain that correspond to individual fingers. Their existence confirms that these "mystacial " whiskers play an important role in sea lion sensation and behavior.

In addition, the researchers identified the brain areas devoted to processing touch sensations from the sea lion's flippers and tail. One of the surprises was discovery of a well-developed region, called Bischoff's nucleus, which is found in animals with prominent tails ranging from raccoons to kangaroos to whales. It is surprising because the sea lion's tail is not prominent at all: It is small and tucked between its hind flippers.

Once mapping of the sea lion's somatosensory region is complete, the researchers plan on mapping the parts of its brain devoted to other functions. "It will be interesting to compare its overall structure to that of primate brains," Sawyer said.

The researchers would also like to map the brains of other pinnipeds, like walrus and elephant seals, which have much larger brains.

https://www.sciencedaily.com/releases/2016/04/160427165513.htm

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Architecture of the Sperm Whale Forehead Facilitates Ramming Combat

Apr. 5, 2016 — A new study addresses a controversial hypothesis regarding the potential ramming function of the sperm whale's head. The hypothesis, originally proposed by a 19th century whaler, suggests that the forehead of male sperm whales evolved partly to be used as a battering ram weapon when fighting for access to reproductively active females. This hypothesis was instrumental in inspiring Herman Melville to write the novel Moby Dick but its mechanical feasibility had never been addressed.

An interdisciplinary team from Australia, UK, USA and Japan used structural engineering principles to test how the head of the sperm whale might be able to resist strong ramming impacts.

"The sperm whale forehead is one of the strangest structures in the animal kingdom," says Dr. Olga Panagiotopoulou from the University of Queensland, and the lead author of the paper. "Internally the forehead is composed of two large oil-filled sacs, stacked one on top of the other, known as the

spermaceti organ and the junk sacs. It is the oil within the upper spermaceti organ that was the main target of the whaling industry in the early 19th century." Panagiotopoulou adds, "This whole complex is highly sexually dimorphic which means that it is much larger in males than in females, a pattern commonly found in species in which males fight to compete for females."

The battering ram hypothesis was originally proposed by a 19th whaler, Owen Chase, after his ship, the Essex, was sunk by a large male that intentionally rammed the ship with his forehead.

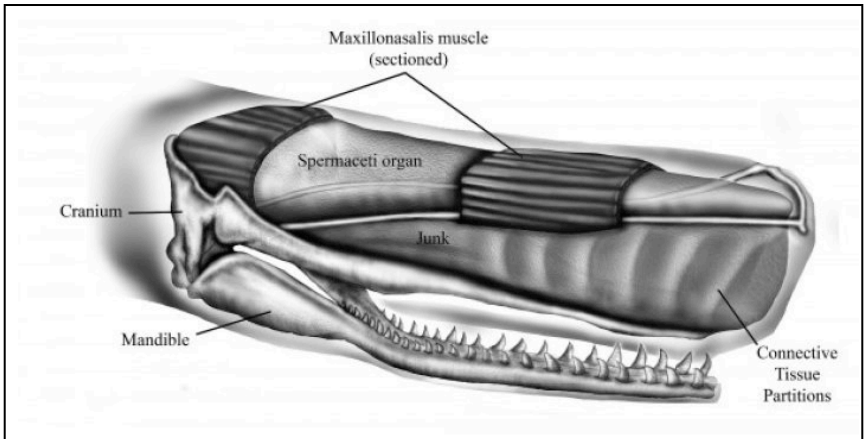

Diagram of the sperm whale head structure. (Credit: Ali Nabavizadeh).

Professor David Carrier, a co-author from the University of Utah said "we know that the sperm whale head is important in transmitting sonar clicks and there are many other hypotheses about its role in communication and buoyancy." "But none of these hypotheses could explain how the sperm whale head could function as a weapon capable of sinking ships that are four to five times the mass of the whale."

"The ramming hypothesis was received with reluctance by the scientific community" says Panagiotopoulou. "This was mainly because the front part of the sperm whale head houses sensitive anatomical structures that produce the sounds essential for sonar and would be in harm's way in a ramming event. Also not many people had actually observed sperm whales ramming."

"We were fascinated when we received a report from a pilot and conservation researcher, who documented sperm whales ramming while flying over the Gulf of California" says Carrier. And adds "we then knew that our ramming hypothesis had some merit and looked into the available technology to test it."

"Creating a computer model to simulate ramming in sperm whales was a challenging task" adds Dr. Spyridis, consulting engineer and a co-author of the study. "When analysing bridges, tunnels, or buildings you are given exact measurements and material properties for the simulations but in this case we were restricted to limited published data and we had to perform a series of sensitivity tests to ensure model efficiency," he adds.

"We used probabilistic simulation to study the mechanical effects of impact variation," said Associate Professor Todd Pataky from Shinshu University in Japan and senior author of the paper. "After creating a series of modified versions of the type and direction of impact force on the sperm whale head, we concluded that the connective tissue partitions embedded within the junk absorb impact stresses and protect the skull from fracturing"

"Increased skull stresses at a ramming event can be detrimental for the animal since they can cause fatal fractures," says Panagiotopoulou. "Our findings show that the mechanical advantage of the structure of the junk may be the result of acquired traits related to selection on male to male aggressive behaviour. Although male sperm whales may not fight frequently, we know that aggressive ramming behaviour is a common characteristic in the group of mammals from which whales are derived -- the even-toed ungulates, the artiodactyls. A closer look into the anatomy of the heads of other species of whales that ram may reveal a variety of protective mechanisms."

"Our study has limitations but we hope to stimulate future research to unravel the mechanical function of the head during head-butting events in other species, where aggressive behaviour has been observed, but remains unmodelled" added Panagiotopoulou.

https://www.sciencedaily.com/releases/2016/04/160405094055.htm

California's Driftnet Fishery: A Costly Toll on the State Economy

By Joana Nasar

Apr. 26, 2016 — Turtle Island Restoration Network's new report 'The California Driftnet Fishery: The True Costs of a 20th Century Fishery in the 21st Century – The Economic Argument Against the California Driftnet Fishery' outlines how the California driftnet fishery costs more to operate than the wealth that is created by the fishery. The just-released-report examines new data that shows the cost of regulating this dirty fishery would substantially

decrease if the California swordfish fishery used more sustainable gear instead of mile-long driftnets.

"California's driftnet fishery not only kills more whales and dolphins than any other on the West Coast, but is a bad investment for U.S. tax payers, who shoulder the costly burden of regulating an outdated method of fishing," said Peter Fugazzotto, strategic director of Turtle Island Restoration Network (SeaTurtles.Org), which has worked for over a decade to reduce wildlife deaths in this and other fisheries.

The driftnet fishery in California consists of roughly 20 fishing vessels. The vessels set out nets the size of the Golden Gate Bridge to float overnight and indiscriminately catch whatever swims into their nets.[1] The California driftnet fishery kills or injures approximately seven times more whales and dolphins than all other observed fisheries in California, Oregon, Washington, and Alaska combined, and 13 times more than any other single observed fishery on the West Coast.[2]

For a fishery that is responsible for less than .3 percent of California's fishing revenue, the environmental impacts, and associated management costs are disproportionately high when compared to other California fisheries. One of those costs is that of animals killed as "bycatch" (a fisheries term for unwanted marine wildlife caught alongside target species of fish). The driftnet fishery catches whales as bycatch. These same whales that are considered without value and bycatch by the driftnet fishery are the basis for California's whale watching industry, with revenues of $20 million a year (nearly 40 times the value of the driftnet fishery).

"The California driftnet fishery has run out of excuses. We have better technology available today that causes less harm to California's whales, dolphins and sea turtles, and costs less to tax payers. The time to phase out driftnets is now," said Doug Karpa, report author and legal program director for Turtle Island Restoration Network.

Turtle Island's new report shows that it is time for California to phase out this costly, outdated, and ineffective method of fishing. Turtle Island has proposed a clear path forward by sponsoring an innovative new bill – Senate Bill 1114 authored by Senator Ben Allen (D-Santa Monica). This smart bill lays out a transition plan to phase out the use of these mile-long nets to a new, more environmentally and economically responsible fishing method using deep-set buoy gear.

"This economic report provides critical information on the high cost of continuing to allow outdated fishing technology to operate off our California coast, and gives lawmakers the information they need to act by supporting Senate Bill 1114," said Cassie Burdyshaw, policy director at Turtle Island Restoration Network.

SB 1114 passed on a 7-2 vote through the California Senate Committee on Natural Resources and Water, and will next move to the Senate appropriations committee, and then to the senate floor for consideration, before moving to the Assembly should it be passed by the full Senate.

https://seaturtles.org/newssection/californias-driftnet-fishery-a-costly-toll-on-the-state-economy/

Foot-Long Ancient Tooth Discovered on Australian Beach

By Nicholas St. Fleur

May 12, 2016 — Five million years ago, a massive sea monster may have eviscerated sharks and whales using gigantic teeth like this.

Murray Orr, an amateur fossil hunter, stumbled on this not-so-pearly-white in February while exploring Beaumaris Bay, a popular site for digging up ancient remains near Melbourne. At first, he had no idea what he was yanking out from the rocks.

"For a moment it looked like an artillery shell, and I thought I might blow my arm off," he said in an email. "But then I saw the curving pointed end and knew it was a sperm whale tooth."

Unbeknown to Mr. Orr, the fossil was unlike anything ever found in Australia. It measured about a foot long, nearly twice the size of any living sperm whale's tooth, and was larger than the daggers that lined a Tyrannosaurus rex's jaws.

When he returned home, Mr. Orr, who works as a real-estate appraiser during the day, emailed a picture of the fossil to Erich Fitzgerald, a paleontologist at the nearby Museum Victoria. Dr. Fitzgerald's response came quickly:

"Crikey!!!! I'd like to find out more about this tomorrow on the phone if at all possible!!!!"

Dr. Fitzgerald instructed him to wrap up the mud-covered fossil to prevent it from drying out. The next day Mr. Orr brought it to the museum to be examined.

"Ironically enough, we did use toothbrushes to clean this fossil tooth," said Dr. Fitzgerald.

After brushing away the dirt and analyzing the tooth's enamel, Dr. Fitzgerald determined that it belonged to a relative of an extinct group of marine behemoths called Livyatan melvillei. He said the newly found Beaumaris beast could have been similar in size to these 60-feet long, 88,000-pound predators.

"The modern sperm whale is a deep diving squid specialist," said Dr. Fitzgerald. "These extinct sperm

Erich Fitzgerald holding a tooth from an extinct sperm whale discovered in Australia. (Credit: Museum Victoria).

whales are probably feeding on larger prey with skeletons, we're talking large fish, sharks, and I suspect, other whales."

Previously, the remains of this group had been found only in Peru, Chile and California, and dated back 12 to 13 million years. Mr. Orr's find was the first discovered outside of the Americas, and at five million years, it lived much more recently.

Rather than keep the ancient Moby Dick memento, Mr. Orr donated the tooth to the museum last month.

"I could sit it next to the TV, but what then?" he said. "Science isn't science on a coffee table."

http://mobile.nytimes.com/2016/05/12/science/foot-long-ancient-tooth-discovered-on-australian-beach.html

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)
4/30 10 am	2 2	Humpback Whales (sleeping) Blue Whales
4/30 9 am	2	Blue Whales (lunge feeding on krill)
4/29 2 pm	6	Humpback Whales
4/29 9 am	16 2 1 1500	Humpback Whales Gray Whales Blue Whale Long-beaked Common Dolphins
4/27 10 am	10 2	Humpback Whale Blue Whales
4/27 9 am	8 150	Humpback Whales Long-beaked Common Dolphins
4/26 9 am	14 8 27	Humpback Whales Killer Whales (CA-10, CA-51B, CA-23) Risso's Dolphins
4/23 2 pm	7	Killer Whales
4/23 10 am	7 2	Killer Whales (hunting and eating a Gray Whale calf) Gray Whales
4/23 9 am	7 2 200	Killer Whales (hunting and eating a Gray Whale calf) Gray Whales Long-beaked Common Dolphins
4/22 9 am	12	Humpback Whales (with tail throws)
4/21 2 pm	35 100	Humpback Whales Long-beaked Common Dolphins
4/21 10 am	20 6	Humpback Whales Pacific White-sided Dolphins
4/21 9 am	19 2 20 100	Humpback Whales Gray Whales Pacific White-sided Dolphins Northern Right Whale Dolphins
4/20 2 pm	16 8 100	Humpback Whales (2 breaching) Killer Whales (CA-20 and others) Long-beaked Common Dolphins
4/20 9 am	25 4	Humpback Whales Killer Whales (CA-51's hunting Sea Lion)
4/19 2 pm	8 15 200	Humpback Whale Killer Whales Risso's Dolphins
4/19 9 am	14 15	Humpback Whales Killer Whales ("tossing" Sea Lion)
4/18 2 pm	11 10	Humpback Whales Killer Whales
4/18 9 am	35 450 1 1	Humpback Whales Long-beaked Common Dolphins Blue Shark Black-footed Albatross
4/17 3 pm	8 15	Humpback Whales Killer Whales
4/17 2 pm	10 15-20 2	Humpback Whales Bigg's Killer Whales Gray Whales
4/17 10 am	2 15 15	Humpback Whales Killer Whales Risso's Dolphins
4/17 9 am	18 15 40 1	Humpback Whales Killer Whales Pacific White-sided Dolphins Black-footed Albatross
4/16 3 pm	15-20	Killer Whales (feeding on Gray Whale calf carcass)
4/16 2 pm	15	Killer Whales (feeding on Gray Whale calf carcass)
4/16 10 am	15 4	Humpback Whales Killer Whales (CA-51's)
4/16 9 am	16 4 2 35	Humpback Whales Killer Whales (CA-51's) Gray Whales Risso's Dolphins
4/14 9 am	21 12	Humpback Whales Killer Whales
4/13 2 pm	8 300	Humpback Whales (1 breached for 40 minutes) Long-beaked Common Dolphins

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