DNA Tests Identify New Dolphin Species in Australia

Marine mammal experts have uncovered a new species of dolphin in Australian waters, challenging existing knowledge about bottlenose dolphins and highlighting the country's marine biodiversity.

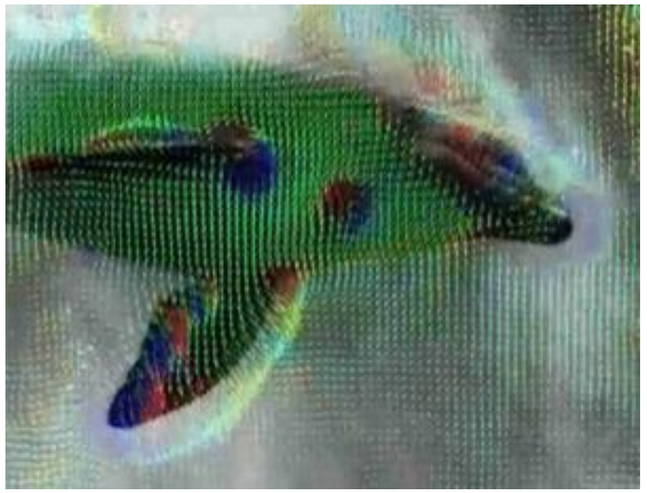
Dr Luciana Möller, of the Marine Mammal Research Group and the Molecular Ecology Lab at Macquarie University led a study that found that coastal bottlenose dolphins from southern Australia should in fact be classified as a new species rather than considered as one of the recognised bottlenose dolphin species.

There are currently two recognised species of bottlenose dolphins and both are found in Australian waters: the common bottlenose dolphin generally found in offshore waters in Australia and the Indo-Pacific bottlenose dolphin, found in coastal waters. Möller said that it is difficult to distinguish some species of bottlenose dolphins using only external body features. ■ SOURCE: WILDLIFE EXTRA

Dolphins' Speed Paradox Solved

New research using high speed videos have shown how dolphins achieve their blinding speeds.

There was something peculiar about dolphins that puzzled the prolific British zoologist Sir James Gray in 1936. He had observed the sea mammals swimming at a swift rate of more than 20 miles per hour, but his studies proposed that dolphins simply do not have the strength to swim so fast. The conundrum came to be known as "Gray's Paradox."



High speed videos have revealed how dolphins swim so fast. Click on image to see the video (It is a link to our website)

Researchers at the Rensselaer Polytechnic Institute in the US studied the movement of water around dolphins as they swim using special high speed videos cameras. With these the team tracked the stream of bubbles around a couple of retired US Navy dolphins swimming through a tank filled with millions of tiny bubbles.

The technique is called digital particle image velocimetry and works by tracking the movement of individual bubbles, determining their speed and direction, and assigning them a colour.

The more prominent the colour, the faster the water is moving. The results show that dolphins can exert as much as 400lbs of force with their tails when they do their signature "tail-walking"—a trick where they keep upright mostly above water with powerful flips of their tails

Stronger than thought

Gray had supposed they could produce less than a tenth of this amount, and imagined that something about the dolphins' skin allowed them to overcome the force of drag in the water and reach high speeds. "For the first time, I think we can safely say the puzzle is solved," said Tim Wei, the Rensselaer scientist who led the study. "The short answer is that dolphins are simply much stronger than Gray or many other people ever imagined." ■

Fishing Practices Still Have an Adverse Effect on Dolphin Populations

Despite the broad implementations of "dolphin safe" fishing practices, fishing activities have continued to restrict the growth of at least one Pacific Ocean dolphin population.

Populations of dolphins in the Eastern Pacific were expected to increase in abundance after successful regulations and agreements were enacted to reduce dolphin deaths as a result of fishing "bycatch," cases in which animals are caught unintentionally along with intended targets, a new report led by a researcher at Scripps Institution of Oceanography at UC San Diego has concluded.

However a new study, published in the October issue of *Marine Ecology Progress Series*, reveals that negative impacts from fishing activities remain. Instead of reducing numbers through direct mortalities, the study shows that fishing activities have disrupted the reproductive output of the northeastern pantropical spotted dolphin. The researchers note that reproductive output of the eastern spinner dolphin also declined, but a direct link to fishing effort was inconclusive.

"This shows that the fisheries indeed are still having an impact."

"The results of this study clearly show that depleted dolphin populations have failed to recover in part due to a decline in reproductive output, and that fishing has had an effect on reproduction," said Cramer, a graduate student researcher in the Scripps Center for Marine Biodiversity and Conservation. "This shows that the fisheries indeed are still having an impact." ■

Are Puget Sound Orcas starving to death?

As salmon runs decline, killer whale numbers take their hardest hit since the 1990s. Seven Puget Sound orcas most likely died this year.

Two of the resident orca families from Puget sound —L and K pods—have been seen in recent years feeding off the California coast in the winter. That was unheard of before early this decade, leading scientists to speculate they are driven to swim hundreds of miles just to meet their minimum nutritional requirements.

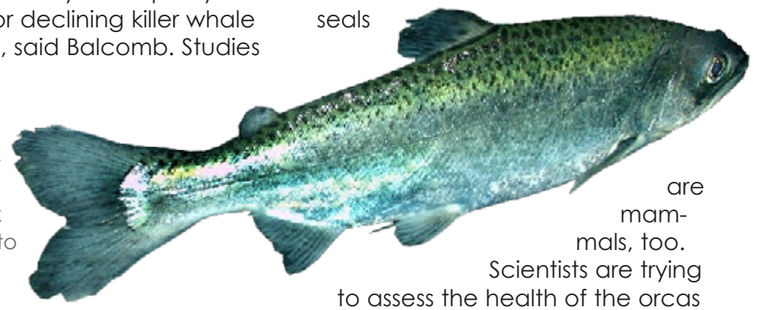
Showing signs of starvation as salmon runs faltered up and down the west coast, Puget Sound's orca population lost seven of its number over the past year, bringing the population to just 83, scientists reported. Experts believe the population of the J, K and L pods that frequent the San Juan Islands and Puget Sound probably originally numbered between 100 and 200.

"Eighty-three is low. The real number that's of concern is that we only have about a dozen reproductive females," said Ken Balcomb, founder of the Center for Whale Research on San Juan Island.

It is conceivable that one or more of the missing orcas might have wandered off on its own and is still alive. But orca scientists doubt that because it's only been documented happening two times in history. Other than that, orcas always have stayed with their families. Researchers are pretty sure all seven are dead—and it makes sense, because supplies of their favorite food were so low. Two recently deceased females showed signs characteristic of starvation—particularly a depression behind her skull where blubber should be. The condition is known as "peanut head."

Chinook salmon

The development marks the biggest reduction in the orca population since a series of bad chinook salmon seasons in the 1990s battered the killer whales' numbers. Revealing the degree to which the orcas are interrelated to a far-flung marine ecosystem, the collapse of California's Sacramento Valley chinook run seems likely to be partly to blame for declining killer whale numbers, said Balcomb. Studies have shown that orcas have a strong preference for chinook salmon, pursuing other prey only when their primary food source is scarce. That makes scientists wonder whether there is something particular about chinook salmon that the orcas need to thrive. "We know that in bad chinook years the orca population declines," Balcomb said. "It's like if you don't feed your pets—they don't survive. They start losing body fat."



Is the disappearance of Chinook salmon to blame?

Results confirmed that the orcas were under "nutritional stress" this year

Chemicals to blame?

Is direct starvation the only reason? There might be something else going on too. In recent years, scientists have noted in the orcas extremely high levels of chemicals known to interfere with reproduction, finding food and other functions. Like humans, orcas begin to burn their fat supplies in times of low food supplies. And the fat is where PCBs and other long-lived industrial chemicals are stored.

Do these chemicals, once freed, have some other effects? Studies on dolphins and Puget Sound harbor seals showed the chemicals caused reproductive problems and made the seals more likely to get sick. Dolphins and seals are mammals, too. Scientists are trying to assess the health of the orcas by collecting their waste and what's in the breath they exhale through their blowholes.

What Hormones Reveal

A team from University of Washington measured the levels of two metabolic hormones in fecal samples from Puget Sound killer whales. The results confirmed that the orcas were under "nutritional stress" this year

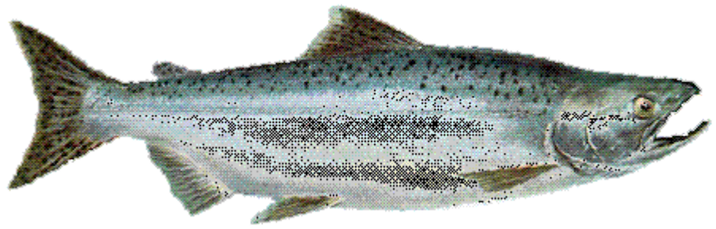
Graduate student Katherine Ayres said levels of thyroid hormone appeared to be low this year when compared with last year—a year when killer whale

deaths were low. These hormones control a mammal's metabolism and increase or decrease over time, causing less energy to be expended when food supplies are low. Consuming less food causes the thyroid to slow the metabolism and conserve fat reserves, which leads to rapid weight gain when food is restored. It appears the Puget Sound orcas went on an unintended diet this past summer, Ayres said.

Other interesting clues came from the levels of cortisone which is another hormone. Cortisol is a rapidly produced in response to mental or emotional stress. Normally cortisol levels are lowest during July and August when chinook salmon are most abundant and whales are under the least stress.

Because cortisol is produced more rapidly during stressful conditions, Ayres also investigated whether hormone "spikes" could be linked to whale-watching boat. Preliminary findings indicated that cortisol levels were higher after a weekend, when more boats are around, than during the week. "It's premature to talk about the boat effect," she said. "The bigger one we're seeing is the nutritional one."

Ayres also is working on a test to measure the levels of toxic chemicals in feces. Because a shortage of food tends to metabolize fat stores in whales, it is likely that toxic chemicals stored in fat would be released when thyroid levels are low. Toxic chemicals are believed to affect the whales' immune systems and increase their risk of disease.



Chinook salmon have a higher concentration of fat than other species of salmon and apparently killer whales like that.

Killer whales off the coasts of British Columbia and Washington State have an uncanny ability for finding chinook salmon, even in months when chinook are vastly outnumbered by other salmon species.

Bacteria or fungi?

Meanwhile other research by biologist, David Bain, and veterinarian, Pete Schroeder, studying droplets emitted from orca blow holes have found drug-resistant bacteria. Puget Sound's orcas collectively harbour more than a dozen different kinds of antibiotic-resistant bacteria—as well as other bacteria known to kill animals that are in a weakened condition. Because some bacteria show resistance to antibiotics, it is likely that they are coming from human sources, possibly stormwater or improperly treated sewage, says Schroeder.

Another concern is that a disease could get into animals on land and spread to Puget Sound. "We don't have an effective barrier to keep it out of the marine environment," Bain said. "It is possible that someone could bring a disease from another continent and expose the whales, causing a significant decline in their population."

For example, a fungus called *cryptococcus gattii* has been implicated in the deaths of dozens of harbor porpoises in the northwest, he said. That same fungus has resulted in the deaths of numerous pets and serious illness for humans. Some researchers believe the fungus was brought to British Columbia in a eucalyptus tree from Australia, where the fungus is native. Spores may have washed into stormwater flowing into the Georgia Basin, which connects with Puget Sound.

Noise perhaps?

A new study suggest that orcas use their natural sonar to find their favorite fish from a distance. Like other many other marine mammals orcas emit high-frequency clicks that are reflected back when the sound waves strike an object. The animals use sonar information to navigate, hunt, and communicate in murky waters. But orcas may have taken their use of sonar to a level of sophistication where it enables them to select specific types of prey.

Previous research had revealed that some killer whales off the coasts of British Columbia and Washington State have an uncanny ability for finding chinook salmon, even in months when chinook are vastly outnumbered by other salmon species such as coho and sockeye. "Chinook salmon have a higher concentration of fat than other species of salmon and apparently killer whales like that," said study co-author Whitlow Au, a bio-acoustician at the Hawaii Institute of Marine Biology. Au and his team simulated echolocation clicks resembling those of wild killer whales to measure the echoes produced when the sound waves bounced off the bodies of three kinds of salmon. The team found that each salmon species has a unique echo pattern based on the different sizes and shapes of their swim bladders.

The air-filled sacs show up clearly in the echo images because they have a different density than the surrounding flesh and water. The swim bladder "is responsible for at least 90 percent of the sound energy that is reflected from the fish," said study team member John Horne of the University of Washington. "Think of it as a hard wall."

Although Chinooks on average are larger than the other two salmon species, individual sizes overlap between the three groups, so the team doesn't think orcas are selecting prey solely based on body size. ■

US Navy agrees to limit underwater explosions in Puget Sound

Already facing lawsuits from two environmental groups over its use of explosives to train in sensitive areas of Puget Sound, the Navy has signed off on an agreement with the US Fish and Wildlife Service to significantly scale back such training through the end of 2009.

The Navy was sued in July by the Public Employees for Environmental Responsibility, PEER, and the Wild Fish Conservancy, arguing that the Navy was ignoring US Fish and Wildlife Service guidelines, and the Endangered Species Act, by conducting underwater demolitions training in environmentally sensitive areas of Puget Sound.

However on November 7, the Navy signed off on the current agreement to limit its training and the power of the explosives it uses, from four to one locations for the next 14 months. The environmental groups said they are confident the lawsuits will lead to a long-term settlement of the issue. The executive director of Wild Fish Conservancy, Kurt Beardslee, said while the Navy obviously needs a training program, the previous program at all four locations was not needed. Under the Navy's consultation agreement with the Fish and Wildlife Service, signed Nov. 7, the Navy's detonations will be cut from four locations to one. The only active location will be in Crescent Harbor east of Whidbey Island, adjacent to the naval air station there.

"We hope that they follow the recommendations of FWS to further reduce or even eliminate all the harm to Puget Sound that they cause," Beardslee said.

The Navy also will maintain a 500-meter zone free of marine mammals and implement a method to monitor the size of fish kills the explosions cause. ■

Meet the Whale Snot Collectors

Whales are too big to take blood samples so what do you do? Use a remote-controlled toy helicopter to get a sample of whale snot.

ZOOLOGICAL SOCIETY OF LONDON

"Scientists have always found it difficult to study diseases in whales because of their size," explains Acevedo-Whitehouse a veterinarian and conservation biologist with the Zoological Society of London to New Scientist. "Most studies on whale pathogens have focused on dead, stranded or captive animals, which are hardly representative of the normal population."

After witnessing the sheer power of whale "blows" in the Gulf of California, she realised that this would be the best way of sampling the insides of a live whale in the ocean.

For species like grey and sperm whales that do not mind the proximity of a boat, the researchers attach their Petri dishes to a long pole and hold them out over the blows. With other whales they resorted to using radio controlled model helicopters. The Petri dishes are attached beneath the metre-long choppers, which are then flown through whale blows.

"The whales definitely notice the helicopter, they turn on their sides to look at it"

"The whales definitely notice the helicopters," says Acevedo-Whitehouse, "they turn on their sides to look at it. But they don't seem bothered. We are collecting very relevant biological information without even touching them."

Each time also sampling the background ocean spray as a control. This lets them identify which bugs come from the whales, and which are present in the sea. The samples are taken back to the lab and scanned for specific DNA sequences that identify individual bacteria, fungi and viruses. As well as looking for pathogenic bugs similar to flu or TB, the researchers are trying to build a profile of what microbes a healthy whale normally carries in its lungs.

The team also hope to study how bacteria and viruses spread through whale populations. The team is still analysing its data but enough has been processed to know that different species carry different bacteria. ■

Whales lose in US Supreme court

The US Supreme Court has removed restrictions on the navy's use of sonar in training exercises near California. The ruling is a defeat for environmental groups who say the sonar can kill whales and other mammals.

The underwater cacophony caused by commercial and military ships has become so intense that it is killing whales, scientists at the World Conservation Congress told the US Supreme Court.

Sounds ranging from the hum of yacht motors to sonar blasts strong enough to destroy a whale's inner ear are wreaking havoc on the ability of these cetaceans to migrate, feed and breed. Many shipping lanes follow the coastal routes that whales have traced for millions of years as they roam the planet's seas. The result is a crescendo of beachings, strandings and collisions as whales and other sea mammals disoriented or physically damaged by noise lose their bearings.

Noise pollution

Just as air pollution reduces one's field of vision, "noise pollution in the sea reduces the zone in which whales can feed and hampers their ability to communicate," Michel Andre, director of the Laboratory of Applied Bio-Acoustics in Barcelona told AFP. "There is no place in the world's oceans that is untouched from what I call acoustic smog: the noises generated by ships."

Some forms of noise pollution are so powerful that "a whale can be killed outright by the shock," added Carl Gustav Landin, head of marine programmes for the International Union for the Conservation of Nature (IUCN). Sonars used by the military and the oil industry can exceed 230 decibels in volume, and can be deadly within a one or two-kilometer radius, Andre said. Eighty-five decibels—the unit used to measure sound pressure—can cause permanent damage to the human ear.

Acidification makes it worse

Research published in the United States last week shows that climate change is amplifying the problem. The acidification of oceans caused by rising sea temperatures reduces sound absorption in the water by up to 40 percent, meaning that noise travels much further.

"a whale can be killed outright by the shock"

Military more important

The plight of the whales ended up before the US Supreme Court. The dispute involved 14 training exercises off the California coast that began in February 2007 and are scheduled to end in January 2009. A federal judge's injunction had required the US Navy to take various precautions during submarine-hunting exercises. On November 12, the US Supreme Court fully reinstating the use of sonar and removed restrictions set by the lower court on the navy's use of sonar in training exercises near California.

In its 5-4 ruling—which is a defeat for environmental groups who say the sonar can kill whales and other mammals—the Supreme Court said the navy needed to conduct realistic training exercises to respond to potential threats and even if the sonar harms the giant sea mammals, national security would take priority. Writing for the majority, Chief Justice John Roberts said overall public interest was "strongly in favour of the navy".

"The most serious possible injury would be harm to an unknown number of the marine mammals," Chief Justice Roberts wrote. "In contrast, forcing the navy to deploy an inadequately trained anti-submarine force jeopardises the safety of the fleet."

Claudia McMurray, US assistant secretary of state for oceans, environment and science and head of the US delegation at the congress in Barcelona, acknowledged it was hard to reconcile security and environmental interests. "It is a delicate balance for us," she told AFP.

But Andre insisted solutions are available. "Technology exists that would allow military to continue their activities without putting the future of whales in peril," he said. "It is a shame this is not happening." ■

Chilean Waters Become Whale Sanctuary

Chile shows the way by turning all of its Pacific Ocean territorial waters into a whale sanctuary.

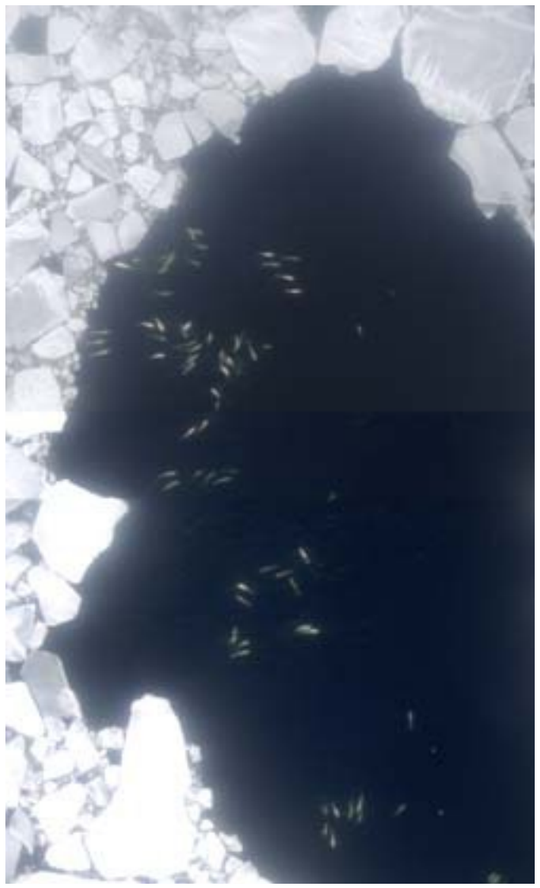
President Michelle Bachelet has signed into law a measure that bans all whale hunting off Chile's 5,500-kilometer coast. The law bans whale hunting both for commercial and scientific purposes.

Bachelet calls the law "a big step ahead in the protection of nature and a major legacy to future generartions."

Chile has not hunted whales for about three decades, but the government sought the law to emphasize its decision to protect whales in its waters. Argentina, Brazil, Costa Rica, Mexico and Panama already ban whale hunting. A whale sanctuary exists in Antarctica. ■

Alaskan Beluga Whales Gains Protected Status

The beluga whales of Alaska's Cook Inlet are endangered and require additional protection to survive, the US government declared on Oct 17, contradicting Alaska govenor Sarah Palin who has questioned whether the distinctive white whales are actually declining.



Aeriial photo of beluga whales gathering along the sea ice off Alaska

The US federal government put a portion of the whales on the endangered list, rejecting governor Sarah Palin's argument that it lacked scientific evidence to do so. The National Oceanic and Atmospheric Administration announced that the Cook Inlet beluga whale population near Anchorage is in danger of extinction, and has been listed as an endangered species. The agancy said that a decade-long recovery program had failed to ensure the whales' survival.

"In spite of protections already in place, Cook Inlet beluga population declined by 50 percent between 1994 and 1998 and is still not recovering despite restrictions on the number of whales that Alaska's native population can kill for subsistence," said James Balsiger, NOAA acting assistant administrator for NOAA's Fisheries Service. He added that recovery has been hindered by development and a range of economic and industrial activities including those related to oil and gas exploration.

Palin's objections

The decision means that before federal agencies can issue a variety of commercial permits, they must first consult with the National Marine Fisheries Service to determine if there are potential harmful effects on the whales.

That has the potential to affect major Alaska projects including an expansion of the Port of Anchorage, additional offshore oil and gas drilling, a proposed US$600 million bridge connecting Anchorage to Palin's hometown of Wasilla and a massive coal mine 45 miles south of Anchorage.

The state does have serious concerns about the low population of beluga whales in Cook Inlet and has had those concerns for many years, Palin said in a statement. "However, we believe that this endangered listing is premature," she said.

Palin in April successfully lobbied for a six-month delay in a listing decision until a count of the whales this summer could be included in deliberations. That count showed no increase over 2007 numbers—375 whales, compared with a high of 653 in 1995. Federal regulators and conservation groups said further delay would be harmful. The National Marine Fisheries Service "will identify habitat essential for the conservation of the Cook Inlet belugas in a separate rule-making within a year," the agency said.

The federal decision pleased environmentalists. ■

Governor Palin: "We believe that this endangered listing is premature."