No.17 · 2009

THE Blackfish Sounder

NEWSLETTER OF THE BRITISH COLUMBIA WILD KILLER WHALE ADOPTION PROGRAM

The southerns are here!

DAVE ELLIFRIT, CENTER FOR WHALE RESEARCH

At age 58, Ruffles (J1) is the oldest male resident killer whale on the B.C. coast, but he still has the pep to do spectacular breaches such as this one. He's one of 28 southern resident killer whales joining our adoption program this year. See story on p. 4

Welcome to the 17th edition of *The Blackfish Sounder*!

It's been a busy year, and we have a lot of news to share. In this edition we tell you about more than three decades of ground-breaking killer whale research by the U.S.-based Center for Whale Research. We describe two recently completed research projects by graduate students sponsored by you through the adoption program—"Exhaust study suggests ways to reduce risk" and "Sea otter mystery continues."

Other stories run the gamut, from light ("Chinook detectors"), to high-tech ("A whale of a measurement challenge"), to political ("Recovery planning continues its rocky ride").

Other stories range from hopeful ("Robson Bight salvage completed at last") to troubling ("Where are the chinook?").

And we announce the addition of southern resident killer whales to our adoption program lineup, as some of you have been requesting for a number of years.

We appreciate your support of the Killer Whale Adoption Program more than ever at times like this, when economic conditions make the task of raising funds for conservation-oriented research especially challenging. Please feel free to pass this newsletter along to friends and relatives, and encourage them to become Killer Whale Adoption Program members as well.

Lance Barrett-Lennard

Dr. Lance Barrett-Lennard
Head, Cetacean Research Program
Vancouver Aquarium

Visit our website!
www.killerwhale.org

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The B.C. Wild Killer Whale Adoption Program, hosted by the Vancouver Aquarium Marine Science Centre, is an ongoing research and conservation effort for the protection of wild killer whales and their habitat.

vancouver aquarium™

ORCALAB

The encased fuel truck at the surface.

Robson Bight salvage completed at last

Two key pieces of logging equipment have finally been removed from the seafloor of the world's most famous killer whale habitat.

The $2-million salvage operation pulled up a diesel fuel-laden tanker truck and a metal container holding barrels of hydraulic oil. They were among 11 pieces of machinery that spilled from a barge into Robson Bight (Michael Bigg) Ecological Reserve in August 2007.

The tanker truck—carrying an estimated 10,000 litres of fuel—was encased in a specially designed metal jacket to capture any leaks.

Immediately following the 2007 spill, some diesel oil leaked and within a few hours a slick extended 14 km down Johnstone Strait. Several groups of whales were in the area at the time and were exposed to the toxic fumes.

Although the spill dispersed within a few days, it was feared that another leak could occur at any time as long as the equipment remained on the seafloor. After months of pressure from environmental groups, the BC and Canadian governments agreed in April 2008 to jointly finance the recovery operation.

The other nine pieces of equipment will remain in the Bight.

DAVE ELLIFRIT, CENTER FOR WHALE RESEARCH

DAVE ELLIFRIT, CENTER FOR WHALE RESEARCH

Recovery planning continues its rocky ride

It's been another eventful year in the long and winding road to a recovery plan for B.C.'s resident killer whales.

Under the Canadian Species at Risk Act (SARA), a recovery plan must be developed for any species designated as endangered or threatened. The southern resident killer whales are classified as endangered and the northern residents are listed as threatened.

SARA is intended to ensure the scientific assessment and listing of species at risk, provide for their recovery, protect their critical habitat, and enable compensation, permits and enforcement. The first step is a recovery strategy, including a designation of critical habitat and, finally, a recovery action plan.

Last year, we reported that a recovery strategy—after much wrangling over wording between scientists and senior government officials—had been completed. A major bone of contention had been the government's attempt to remove the key section on threats to critical habitat.

"This would have effectively removed any teeth from SARA as it applies to killer whales," says the Vancouver Aquarium's Dr. Barrett-Lennard, who co-chaired the team of scientists and other experts who developed the strategy.

Fortunately, that battle was won and critical habitat remained in the recovery strategy. But the next skirmish soon emerged. Last fall, the government issued a "protection statement," claiming that existing laws and guidelines are already sufficient to protect killer whale habitat.

Habitat threats to killer whales include declining salmon stocks, toxic contaminants, increasing vessel traffic, and acoustic disturbances such as seismic testing and military sonar.

"The statement essentially said, 'We recognize there are threats to the whales, however they're already being addressed," says Barrett-Lennard. "This was the opposite conclusion from that of the experts who wrote the strategy."

Nine outraged environmental groups quickly banded together and launched a lawsuit against the government, claiming it was failing to legally protect the critical habitat of "B.C.'s most iconic marine mammals."

In February, to everyone's surprise, the government withdrew the protection statement and issued an "order to protect critical habitat," a stronger measure that gives legal protection to endangered species habitat.

It's the first time that Canada has issued an order under SARA to protect critical habitat—for any species.

The order is what everyone had wanted all along, says Barrett-Lennard, because it's a legal commitment to action. The government now has four years to develop an action plan, ideally in consultation with independent killer whale scientists. "A lot of work needs to be done," he says. "We're waiting to see that work start and how much effect it will have."

In the meantime the nine environmental groups—represented by Ecojustice (formerly the Sierra Legal Defence Fund)—are not dropping the lawsuit. They say the government has not clarified what aspect of critical habitat the order is meant to protect and is apparently intending to decide on its scope over time.

"Endangered orcas have no time for a 'trial and error' approach. Until the Canadian government publicly clarifies how killer whale habitat will be legally protected, this case is not resolved," said an Ecojustice lawyer in April.

Despite the rocky ride, effective protection for killer whales under SARA is close and achievable, says Barrett-Lennard. "The public cares about killer whales, the science is solid and the story is compelling. If we can't do this for killer whales, then we can't do it for any species."

Where are the chinook?

A key habitat need for resident killer whales—like all of us—is an abundant food supply. For the whales, that primarily means chinook salmon—the biggest and fattiest of B.C.'s five salmon species.

But chinook numbers have crashed along much of the coast, from B.C. down to California. As chinook become harder to find, the whales spend more energy foraging for food. This means that they have fewer reserves available for disease resistance and reproduction—which could have serious effects on the population.

In 2008, there were disturbing signs that the hunt for chinook is taking its toll. A few whales in the endangered southern resident community were seen with "peanut head," a depression behind the blowhole that indicates low fat reserves and poor health. Several whales disappeared and are presumed dead. Among them were two breeding-age females—an age group in which deaths are uncommon.

"Unexpected mortalities like those are a concern," says Dr. John Ford, senior marine mammal scientist with Fisheries and Oceans Canada. "This pattern was also seen in the late 1990s and was coincidental with the coast-wide decline in chinook abundance."

Studies led by Ford have shown that 72 per cent of salmon consumed by resident killer whales is chinook. This preference is so strong that they'll ignore other types of salmon even when they're more plentiful.

Another study indicated a strong correlation between killer whale and chinook abundance. "When chinook numbers drop, there's a lag of about a year before we see the effect in killer whales," says Ford.

The southern residents typically take the first hit—as we may be seeing now—with northern residents following one or two years later.

Ironically, the northern residents are enjoying a mini population boom. The latest count is about 250—the highest since our study began 35 years ago. But that may soon change.

Last summer observers noticed northern residents were traveling further, foraging longer and catching fewer fish. And for the first time ever, seasoned researchers witnessed Steller sea lions stealing salmon from the whales—another sign that big meals are hard to find.

B.C.'s chinook numbers are expected to improve slightly in 2009 but are still not anywhere near a healthy level. "Historically, chinook abundance may have been 10 times higher than it is now," says Ford. "Also, the fish now are much smaller, on average, than they used to be."

Causes of the chinook decline are likely a combination of climate and ocean change, habitat destruction and overfishing.

"There is no easy fix because chinook are difficult fish to manage," says Ford. "We need to work with the salmon specialists to better understand the determinants of chinook abundance and to figure out which stocks are important to the whales."

Ford's ongoing diet study is getting some answers. DNA analysis of fish scales collected from hundreds of chinook killed by whales can identify stocks and even what river a fish comes from.

"Once we know which stocks are of critical importance," says Ford, "we can take measures to protect those fish and factor what the whales need into fisheries management plans."

U.S. DEPARTMENT OF THE INTERIOR

Chinook detectors

How do resident killer whales find their preferred food—chinook salmon—in dark, murky water especially when they're surrounded by other types of salmon?

Even Superman with his X-ray vision would envy the answer.

A study by researchers at the Hawaii Institute of Marine Biology and the University of Washington suggests that the whales' sophisticated echolocation system is easily able to distinguish a chinook's swim bladder from that of other fish.

The researchers bounced recorded replicas of whale echolocation clicks off tethered sockeye, coho and chinook salmon and measured the structure of the returning echoes. They were clearly different for each species, even if all the fish were the same size.

The sonar echoes differ because the swim bladder in a chinook salmon is half the size of those in other species, and the swim bladder is responsible for most of the reflected sound energy, the study found.

Listen for yourselves to the biosonar pulses from chinook and coho at www.acoustics.org/press/156th/au.html. Sound the same to you? The pulses would have to be slowed down 45 times for us to clearly hear the difference. The whales, meanwhile, have it all figured out.

ASTRID VAN GINNEKEN, CENTER FOR WHALE RESEARCH

Resident whales enjoying a chinook meal.

DAVE ELLIFRIT, CENTER FOR WHALE RESEARCH

Adoption program expands south

For 17 years, the BC Wild Killer Whale Adoption program has had northern residents and several groups of transient killer whales available for you to adopt. Well, we felt it was time for a change!

Say hello to 28 new adoptees from the southern resident killer whale population.

There are three pods in the southern resident community—J, K and L. They're often seen during the summer months off southern Vancouver Island; traveling, feeding and socializing around Victoria and the Gulf Islands in Canada and the San Juan Islands in the U.S.

Southern and northern resident killer whales don't mix. In fact, acoustic studies show their calls sound very different. Listen for yourself at www.killerwhale.org/index2.html.

The southern resident population is listed as endangered in Canada and the U.S. They are especially vulnerable to human impacts because their core habitat is close to major urban centres. As of April 2009 the population totals only 85 individuals.

ID photos and the population status of the southern residents are collected and monitored by the Center for Whale Research (CWR) on San Juan Island (see sidebar).

"Most of the whale research on the Canadian side has historically focused on the northern residents, so that's why our program has until now not included southern residents," says the Vancouver Aquarium's Dr. Lance Barrett-Lennard.

"It's always felt like an unfortunate omission, however, because we are ultimately concerned with the conservation of all killer whale populations."

The addition of the southern residents is being done in collaboration with the CWR. A portion of your adoption dollars will help support the center's students and research projects. We'll be sure to tell you about their achievements in the years to come.

Individuals available for adoption are from the J2, J4, J7, J9, K18, K8, L5 and L37 matrilines. To "meet" them all, visit our website at www.killerwhale.org.

Introducing the Center for Whale Research

1976 was a benchmark year for killer whales in the northeast Pacific.

That was the year that B.C. researcher Dr. Michael Bigg, who pioneered the use of photo-ID to study killer whales, handed in his first census report to the Canadian government.

It was also the year that the U.S. government contracted marine biologist Ken Balcomb to conduct the first killer whale census in the inside waters of northern Washington State.

Both studies were responding to growing concerns over 10 years of whale captures in the region for the marine park industry. The southern resident whales were especially hard-hit, with 45 captured and least 13 killed during the round-ups.

Prior to the two studies, it was widely believed that there were many hundreds, if not thousands, of killer whales living along the B.C. and Washington coasts. Live captures were subsequently halted in both countries.

Just as the Canadian photo-ID study of northern residents and transients continues to this day, so does the U.S. study, led by Balcomb. It's now known as Orca Survey, a long-term study of the population dynamics, social structure and individual life histories of the southern resident killer whales.

In 1985, Balcomb established the Center for Whale Research at his waterfront home on San Juan Island. Orca Survey—which now involves dozens of researchers, students and volunteers—keeps exhaustive photo-ID records of all southern residents and their travels, and monitors human activities around them.

The center's findings are shared with scientific organizations, governments, conservation and education groups, and the public. Visit the center at www.whaleresearch.com.

DAVE ELLIFRIT, CENTER FOR WHALE RESEARCH

Whales face dietary double-whammy

As we tell you elsewhere in this newsletter, there are strong signs that BC's resident killer whales are having trouble finding enough chinook salmon to eat.

Now, there's evidence that the chinook they do find are laced with dangerous man-made chemicals.

The new study, led by University of Victoria PhD student Donna Cullon, looked at concentrations in chinook of a group of chemicals known as persistent organic pollutants (POPs). These include PCBs, dioxins and DDT.

POPs can disrupt hormones, impair reproduction, cause developmental abnormalities and weaken the immune system. Although they're banned in North America, they're still in use in some parts of the world and find their way into global food chains via winds and ocean currents.

"Our study shows that the salmon accumulate almost 100 per cent of their contaminant load at sea," says Dr. Peter Ross, a wildlife toxicologist with the Institute of Ocean Sciences near Victoria. "This tells us something is happening in the Pacific Ocean. This is not just a regional issue."

Levels of POPs in chinook are relatively low, he adds, but because killer whales are at the top of the food chain, the toxins accumulate in their bodies with every fish they eat. Resident killer whales can consume as much as 225 kg of fish a day.

The POP cocktail is especially potent for southern resident killer whales. Not only are higher concentrations found in more southerly chinook—due to the proximity of urban, industrial and agricultural environments—but these fish are nearing the end of their journey and have less body fat.

As a result, southern resident killer whales may have to eat up to 50 per cent more chinook than their northern resident counterparts.

"We estimate that southern residents are consuming four to six times more PCBs than northern residents," says Ross. It explains why southern resident males carry the highest PCB loads—almost 150 parts per million—making them some of the most contaminated marine mammals in the world.

Female killer whales transfer much of their toxin load to their calves—particularly their first-born—through milk.

When combined with increasing climate-related stresses on salmon numbers, this is very troubling news for the whales—and for us," says Ross. But there's a glimmer of hope for killer whales. This March, the Canadian government released a plan to ban PBDEs, a class of chemicals used as flame retardants in everything from computers to upholstery and plastics.

PBDEs are considered just as toxic in the environment as PCBs. In a 2006 study, Ross summarized evidence that PBDE levels are doubling in marine mammals and fish in B.C. every 3.5 years.

"While science alone can't solve all of the problems facing our endangered killer whales, it does help identify problems and point the way toward solutions," says Ross. "The rest is up to us."

VALERIE SHORE

Balcomb

It's all about chinook

Ken Balcomb doesn't mince words when he talks about the precarious future of the southern resident killer whales.

"The fact is, these whales will not be here in 50 or 60 years unless we take drastic action to bring back the salmon," says the founder of the Center for Whale Research.

Balcomb is convinced "beyond a doubt" that the whales are not getting enough to eat for year-round survival. And the consensus of fisheries scientists, he notes, is that wild stocks of chinook will be extinct by 2100, while a few hatchery stocks may be maintained for human harvest.

"Most people think 'Why don't the whales eat something else?' But from an energetic and an evolutionary perspective, that's not reasonable for their survival."

Years ago, Balcomb suggested to Canadian and U.S. fisheries managers that an allotment of salmon be awarded to killer whales. The idea was dismissed as ludicrous.

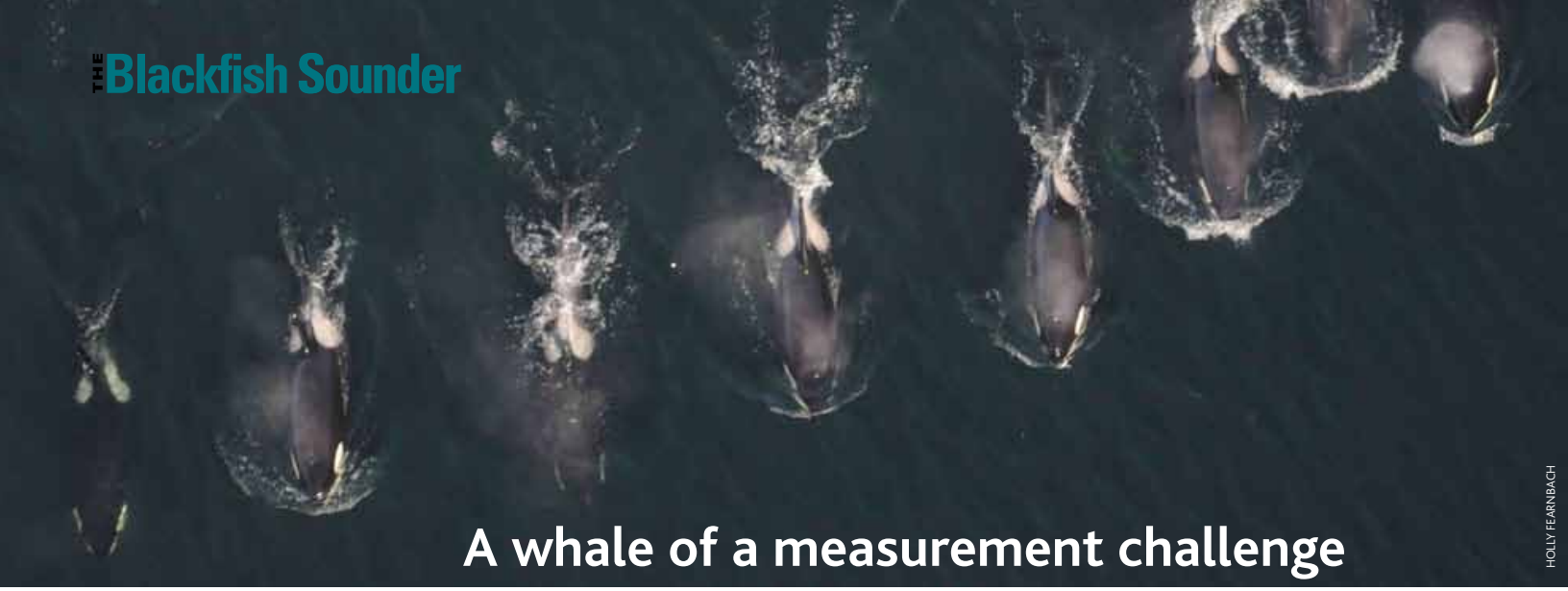
Action to restore chinook populations must be immediate throughout the range of the whales, he says. "I'm usually optimistic, but the U.S. and Canada endangered species acts are continually being assailed by powerful economic interests that seek the larger share of resources for humanity, not wildlife."

Ultimately, he says, "the vast majority" of the human population must voice support for action, accepting that there will be economic "costs."

"We should not make the mistake that it is only the whales at risk," he adds. "We too are in an unhealthy environment."

What can you do to help?

- Do "whale-friendly" gardening. Don't use chemical pesticides and fertilizers that run off gardens and into the water system. They eventually end up in the ocean, no matter where you live.
- Go organic and local with your foods and other products.
- PBDEs leach into the environment from household products.
- Choose PBDE-free when purchasing furniture and electronics. Find out which companies have stopped using them at www.mnceh.org/campaigns.flame.php.
- Think before you buy it. Do you really need it? High consumerism increases the spread of manufacturing contaminants.



HOLLY FEARNBACH

A whale of a measurement challenge

We have body measurements of killer whales from whaling records and beached whales, but is it possible to measure the size of a live wild killer whale?

A team led by Dr. John Durban at the Center for Whale Research is using high-resolution aerial photography and enhanced laser pointers to do exactly that.

To measure the length of a wild whale, Durban takes photographs from a helicopter that flies directly over the whales (but high enough to minimize disturbance). He then calculates the overall length, and body and head width of each whale.

To measure whales from a boat, Durban uses two parallel laser pointers on his camera that project dots exactly 10 cm apart on a whale. He then extrapolates the distance from the whale's blowhole to its dorsal fin with the "laser dot ruler" in the photographs.

Durban is comparing the two methods, and hopes to use his boat-based "blowhole to dorsal fin" measurement technique to calculate overall length of whales in the future.

When that's perfected, he'll be able to determine growth rates by comparing annual laser pictures, providing a good indication of the long-term health of individuals and populations.

Exhaust study suggests ways to reduce risk

What can be done to reduce the exposure of killer whales to exhaust fumes from whale-watching boats?

In last year's newsletter we told you about University of British Columbia graduate student Cara Lachmuth and her study to find out whether boat exhaust may be putting the whales at risk.

Lachmuth used computer modeling to estimate quantities of airborne pollutants inhaled by the whales. She then developed a physiological model for killer whales to determine the consequences of this exposure.

She's now finished her study and has some recommendations for whalewatching regulators to consider. "The most important factor is that vessel operators position their boats downwind of whales," she says. "In reality, this may be difficult, so the next best thing is to cap the number of vessels."

She suggests there be no more than 20 boats within 800 metres of the whales at any given time.

Other strategies include limiting the amount of time that boats remain with the whales, "diligent" enforcement of the 100-metre vessel approach zone, and a requirement that boat operators stay at least 100 metres from each other.

"It is an incredible gift to see these animals in their natural environment, but we need to ensure that our ecotourism activities are as low-impact as possible," says Lachmuth.

Aquarium hosts Russian whale researcher

In 2008, killer whale researcher Dr. Olga Filatova from Moscow State University in Russia joined the Vancouver Aquarium's cetacean research team for a six-month term in the Vancouver Aquarium's Levy Marine Mammal Research Centre.

Filatova studies the dialects and vocal behaviour of resident and transient-type killer whales in Kamchatka, Russia. Interestingly, she and her colleagues discovered that the resident killer whales in Kamchatka bear many similarities to residents off the B.C. and Alaska coasts. The Kamchatka whales live in stable family groups like B.C. residents, but focus on Atka mackerel and salmon.

Filatova was very keen to work with Canadian researchers to learn more about the similarities between different populations of killer whales. While she was here, Filatova worked closely with Drs. Harald Yurk, Lance Barrett-Lennard, John Ford (Fisheries and Oceans Canada—Nanaimo) and Alaskan researcher Craig Matkin.

After analyzing the recordings of killer whales from different areas, the group found that the dialects of Aleutian whales are more similar to Kamchatkan pods than to whales from Alaska and B.C.

However, even Kamchatkan and B.C. whales have some dialect characteristics in common. It's not known whether this is because they're related or whether it's the common rule for all resident dialects. More research is needed!

Orca update

Four new arrivals were spotted in the northern resident population during the 2008 field season. **Sonora** (A42) welcomed her third calf, **A88**. **Schooner** (A64) is a first-time mom with the birth of **A89**. **Skagit** (A35) has a fourth calf, **A90**, and **Klaskish** (B14) has a second calf, **B17**.

Sadly, we bid farewell to **Gikumi** (C20) and young **Seabreeze** (G66).

New to the adoption list are; **Spicer** (C27), the first calf of **Quadra** (C21); **Kelpie** (C28) the second calf of **Fifer** (C13); **Ashby** (D25), the second calf of **Christie** (D11); and **Kevin** (R47), the first calf of **Kimsquit** (R13). As you may recall, Quadra was killed after being struck by a boat in 2006, however Spicer is doing well in the care of grandmother **Lama** (C8).

Brand new to our adoption list are 28 individuals from the southern resident killer whale population. See story, p. 4 for more details.


Spicer (C27)


Schooner (A64)

Last year's update on the transient scene reported that **Pachena** (T12) and **Seaforth** (T29) had not been seen for several years. **Nitinat** (T12A) was spotted several times again in 2008 traveling without his mother, Pachena. Our colleague and longtime keeper of the killer whale birth and death records, Graeme Ellis (Fisheries and Oceans Canada—Nanaimo), now presumes that Pachena and Seaforth are both dead.

In other news, we now know that **Bend** (A72) is a female, and **Magin** (A71) is a male. Magin is beginning to "sprout," the term used to describe the upward growth of a male's dorsal fin as he approaches sexual maturity. It will take several years for Magin's fin to reach its full height of about 1.8 metres.


Lunge-feeding humpback

GRAEME ELLIS

Big questions for BIGG winner

We know that baleen whales engulf their prey, but since it happens underwater, we know very little about how they do it. This is one of the things that Jeremy Goldbogen, the 2009 Michael A. Bigg Graduate Student Award recipient, hopes to find some answers.

The University of British Columbia PhD student has already made some interesting discoveries. By looking at the feeding behaviour of tagged humpback and fin whales, he's discovered that these baleen whales may lunge-feed several times underwater without surfacing in-between to breathe. And results from a tagged fin whale show that when these whales gulp in immense quantities of food and water on a dive, their bulging mouth cavity acts like a parachute and brings the whale to a full stop in about three seconds! The annual Michael A. Bigg scholarship is named after B.C.'s pioneer killer whale researcher Dr. Michael Bigg, who died in 1990.

Sea otter mystery continues

The plot thickens in the mystery of the disappearing sea otters.

In our 2007 newsletter we told you how University of British Columbia graduate student Katie Kuker was going to try and find out what has caused 65,000 sea otters in the western Aleutians—more than 95 per cent of the population—to vanish over the last 15 years.

In particular, she was looking for evidence that the culprits are killer whales.

Now, after close analysis of the "case" for killer whale predation, Kuker has concluded that there is no hard evidence.

Researchers agree that the sea otter decline followed a significant regime shift in the North Pacific and that populations of other marine mammals also crashed in the western Aleutians. Some scientists pointed the finger at transient killer whales, suggesting they sequentially shifted their prey preferences as marine mammal populations dwindled.


VANCOUVER AQUARIUM

But this theory—which is now presented as an established fact in ecology textbooks and other sources—has little evidence, says Kuker. "The existing data to support this theory are inconclusive. It deserves further examination and may very well be the answer, but research into alternative explanations should continue."

Other possibilities include toxins, disease, climate change and—surprisingly—sharks. There are signs that several species have become more abundant in the region. Because the timing of this increase matches the otter decline, a possible connection should be investigated, says Kuker.

Marine mammal network needs your help

Do you know what to do if you see an injured, harassed or dead marine mammal?

The BC Marine Mammal Response Network (BCMMRN)—a collaborative program with Fisheries and Oceans Canada, other government units, the Vancouver Aquarium and various research, wildlife and conservation groups and individuals—has been established to help track and assess threats to marine mammals.

The goal of the response network is to help distressed marine mammals and collect data from dead ones. Sick, injured or dead animals can provide important information to researchers about inappropriate or illegal human activity, disease and contamination, vessel strikes and entanglement.

In May 2009, the network received a report of a juvenile humpback whale near Knight Inlet that had become entangled in 11 prawn traps. Ropes and other fishing gear can cut a whale's skin and cause infection, or worse, entangle it so severely that it can't eat, swim or breathe properly.

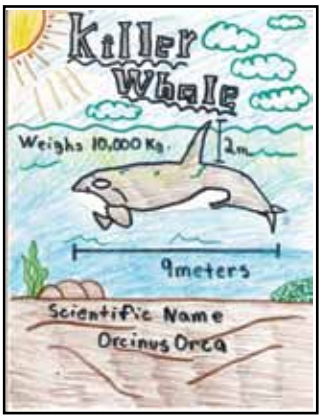
Thanks to a quick response, all of the prawn traps were successfully removed from the photo-identified humpback known to researchers as Twister.

Response time is crucial, so if you find a marine mammal in distress or dead, take photos and call toll free at 1-800-465-4336. Like all wild animals, marine mammals can carry a variety of diseases, so for your own safety please don't touch or try to move the animal.

If you would like to become a volunteer responder, and help out in your local area, please contact the BCMMRN coordinator (lisa.spaven@dfo-mpo.gc.ca).

VALERIE SHORE

YOUR ARTWORK



Thank you to all the talented young artists who contributed some great killer whale drawings. Sorry we can't show them all, but here's a sampling.

Left: Ben Campbell, age 5. Centre: Carlos Enrique Fuentes-Marcial, age 11 (Ceiba, Puerto Rico). Right: Colin Hansen, age 7.

THANK YOU

Thank you to the following people who continue to lend their time and energy to the adoption program: **Graeme Ellis**, for giving us access to the northern resident and transient ID photos; **Ken Balcomb** for giving us access to the southern resident ID photos; **Wilf Hatch** for long hours in the dark room; **Graeme Ellis**, **Jim Borrowman**, **Jared Tower**, **Alexandra Morton**, **John Ford**, **David Ellifrit**, **John Durban** and the many other contributors to the photo ID study that makes this program possible. A big thank you to the following research patrons and extended members who made very generous contributions to our program this year: **Bill Weeks**; **Karen Hansen** and **Stan Hutchings**; **Kelly Wong**; **Kalel Harrison**; and **Dominic** and **Tate Hilton**. And a very special thank you to all whale adopters for continuing to make this adoption program possible.

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