

MYSTERIES OF THE ANIMAL WORLD

SEA OTTERS: They're dying because their ocean is polluted - cat scat is one culprit, study says

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Scientists at UC Davis revealed Tuesday that the health of California's sea otter population is even more tenuous than previously thought -- and almost certainly worsened by polluted ocean waters, including contamination from the feces of the ordinary house cat.

The most common parasite besieging California sea otters is *Toxoplasma gondii*, a new study shows, and the otters afflicted with it were four times more likely to die in shark attacks as uninfected animals. The cat is the only animal that sheds *Toxoplasma* cysts in its feces.

"Just like any organism, sea otters can get sick from their environment, and that's what's happening here," said Christine Kreuder, a veterinarian, graduate student of epidemiology at UC Davis and co-author of the groundbreaking study released Tuesday.

Unexpectedly, the study also found that -- aside from the parasites, sharks and whirling boat propellers plaguing them -- the otters are suffering from high levels of heart disease.

UC Davis scientists, along with researchers at the state Department of Fish and Game, analyzed autopsy results of 105 dead otters retrieved from February 1998 through June 2001. The study found that:

- Thirteen percent of the animals died of heart disease, a previously unknown cause of mortality in this species.
- Nearly two-thirds of the otters died of disease, an alarmingly high number given that 47 percent of the dead creatures were between the ages of 4 and 9 years -- the prime of life for otters and their peak years for breeding.
- About 38 percent of the diseased animals suffered from parasitic infections that can invade the brain and cause seizures, blindness and other neurological ills.

swollen hearts

While previous studies have found high disease rates among California otters, Kreuder's study is the first to identify heart disease as a significant cause of death.

Study co-author Melissa Miller, who conducted the necropsies on the subject animals, found a number of inflamed, enlarged and discolored hearts -- evidence of congestive heart failure.

"This is brand new and a mystery," Kreuder said. "Part of my work now is to find the underlying causes, which may be pathogens or nutritional deficiencies. "

Previous studies have shown a strong link between contaminated cat poop and dead sea otters, and this study appears to confirm what researchers have suspected: Parasite-ridden otters may die disproportionately from shark attack and boat strikes because they are too impaired to stay out of harm's way.

"They are at a severe disadvantage neurologically," Kreuder said. "The (infected otters) shake and twitch, which may attract the sharks' attention. And they may be less likely to stay in protected areas where they can avoid shark interactions."

Oddly, the sharks do not appear to be eating the otters they kill.

"They appear to be checking them out, in the way sharks do, with a little nip," Kreuder said. "But a little shark nip is major damage to a little sea otter."

strong recovery -- until now

Once abundant from Southern California all the way to Alaska, otters were virtually wiped out by fur hunters by the turn of the 20th century.

Southern otters were thought to be extinct for decades before a small surviving colony of perhaps 38 to 50 individuals was found in 1938 off the Big Sur coastline. Federal protections kept the hunters at bay, and the population grew slowly but steadily until 1995, when it peaked at 2,377 animals. By last year, it had dropped back to 2,139.

The study does not directly address the unusual number of dead otters found on state beaches this winter and spring -- 100 since Jan. 1 -- but may hold ominous clues to the cause of their demise. Many of this year's victims also have been animals in their prime breeding years, and a large proportion were suffering from infectious disease.

The fact that the population now numbers only about 2,000 and is waning, even with a ban on hunting and other protections, is worrisome -- and seems to indicate that incremental pollution, overfishing and other human pressures are enough to threaten the otters' survival.

"I don't believe we are going to find a single excuse," said Mike Murray, chief veterinarian for the Monterey Bay Aquarium. "It's likely that we're going to find resource limitations on top of contamination on top of pathogen pollution on top of some other factor."

The study fingers the Morro Bay area and the southern end of Monterey Bay as having clusters of suspicious sea otter deaths, giving researchers a starting point to investigate environmental conditions that may contribute to the incidence of disease.

The study's highest value may be in helping clarify where research should focus. For example, *Toxoplasma gondii* -- the same parasite that can cause pregnant women to miscarry -- is spread by exposure to cat feces, and the *Sarcocystis neurona* parasite through opossum feces. Otters most likely contract *Toxoplasma gondii* by eating bivalves that filter the floating cysts from contaminated seawater.

But so far, nobody knows for sure how feces from these nonnative, land-living animals are washing into the

coastal waters in such deadly abundance. No one can yet say what cat owners should do to avoid contributing to the problem or what role feral cat colonies may play.

"That is where research is going to be in the future," Kreuder said. "We have to trace it to its source."

tainted crabs

Solving the problem presented by another killer parasite, acanthocephalans, commonly known as the thorny-headed worm, will require a vastly different approach.

Acanthocephalans is a bird parasite that spends part of its life cycle inhabiting tiny sand crabs. Sea otters pick up the worms when they eat the crabs, and the worms hatch inside them and can burrow through their intestinal walls, causing fatal infections.

Sand crabs, however, are not a normal part of the sea otter diet -- leading scientists to wonder why the otters are turning to this dangerous food source.

Before they were hunted to near extinction, this part of the California coast was home to an estimated 20,000 otters, which raises the question: Is the ocean environment now so depleted by overfishing and pollution that it can't even support one-tenth of the historic population?

Research now under way will compare wild otters' current diets with a similar study conducted in the 1980s, when the population was growing.

The new tasks facing scientists appear distinctly less enjoyable than previous research, which largely focused on saving stranded otters, nursing them to health and returning them to the wild. Those efforts, intended to save the species in the event of an oil spill, are still crucial.

"Bottle-feeding a cute little pup is way easier than opening a dead carcass," said Dave Jessup, a senior wildlife veterinarian with the Department of Fish and Game. "No way around it. There's nothing cute about a stinky dead animal.

"But what we're doing now will determine whether the sea otter population turns around and increases or whether it continues to drop and become seriously depleted," Jessup said. "If we don't figure out what is killing prime-age adults in their reproductive years, then saving all the stranded pups is not going to save the population."

the otter census

A study released Tuesday showed that nearly half the southern sea otters found dead from February 1998 through June 2001 were in their prime breeding years - a fact that has ominous implications for the species' ability to rebound.

1982: 1,346

1995: 2,139

Peak: 2,377

Significant clusters of sea otter casualties from 1998 to 2001

southern sea otter

Scientific name: The southern sea otter is known as *Enhydra lutris nereis*; its subspecies name has Greek roots that mean a sea nymph or swimmer.

Family mustelidae: Includes otters, weasels, ferrets, minks, skunks, badgers.

Physical characteristics: Average 4 feet in length; males weigh approximately 65 pounds, females 45 pounds. They have webbed hind feet for swimming, strong canine teeth, retractable forepaw claws, closable ears and nostrils for underwater swimming, and dense waterproof fur for warmth as they have no insulating fat layers.

Habitat: Found near shore in shallow waters, generally 115 feet deep or less. Kelp beds are the ideal environment for otters.

Diet: Carnivores. Feed on marine invertebrates such as abalone, clams, sea urchins, crabs, barnacles, snails, squid, octopuses, chitons, worms and sea stars. Otters eat 20-25% of their body weight each day to maintain their high metabolism.

Behaviors: Use tools for feeding; spend hours each day grooming, which keeps the fur waterproof by coating it with oil from the skin; strong sense of smell; excellent eyesight in and out of water. Male and female sea otters usually segregate into separate groups. Predators: After being hunted nearly to extinction in the early 1900s, sea otters became a protected species.

Now their biggest threats are from sharks and birds and a degraded environment.

Reproduction: Females reach sexual maturity at 3-5 years; males at 5-6 years. Male sea otters mate with several females throughout the year, usually bonding with one female for 3-10 days. A single pup is born to the female a year after breeding. Twins are rare. Pups weigh 5 pounds at birth and are born with a fuzzy coat that prevents them from sinking. The mother cares for her pup up to a year after its birth.