



MERCURY NEWS FILE PHOTOGRAPH

An inquisitive otter checks out a visitor to Elkhorn Slough wetlands in Moss Landing.

DISTURBING DECLINE

California's otters, once on the rebound, are dying again

BY KATHLEEN WOLFE
Special to the Mercury News

VOLUNTEERS respond to calls at beaches from Mendocino to Santa Barbara every week of the year, carrying plastic bags and latex gloves tucked neatly into backpacks.

Staying far from the turbulence of breaking waves, they look past the darting sanderlings and half-buried fire rings for larger forms, crumpled and black: sea otter carcasses.

The number of dead animals is increasing. This year, volunteers have recovered an average of one

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beached otter every other day somewhere along the California coast. The network collected 152 in 1997; this year's count is already up to 200.

While biologists say Alaskan otters are being eaten by starving

killer whales, no one knows for certain why the southern subspecies is declining off the California coast.

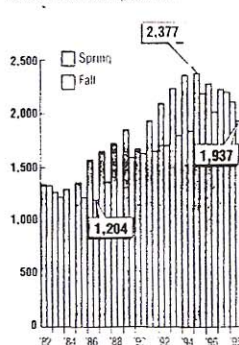
The latest studies indicate three main causes: a fungus, a parasitic worm and some single-celled microorganisms. Although not all scientists agree, some evidence also suggests that a chemical pollutant could be weakening the immune systems of sea otters much like HIV weakens the immune defenses of humans.

As recently as three years ago, biologists had contemplated removing sea otters from the threat-

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Falling numbers

California sea otter population



Source: Friends of the Sea Otter

Sea otters in brief

Size: four to six feet long

Weight: up to 100 lbs.

Habitat: Reside near kelp beds along the shores of western North America and Siberia. They seldom leave the water.

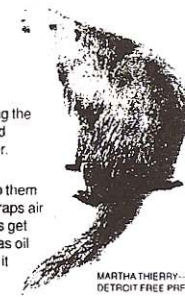
Characteristics:

Otters lack a layer of blubber to keep them warm, instead the otters' thick coat traps air and keeps their skin dry. If their coats get soiled or matted from hazards such as oil spills, the trapped air is lost and with it buoyancy and insulation, endangering them.

Otters sleep and eat while floating on their back. When eating shellfish, they will often pound a clam or mussel against another, or they will balance a rock on their bellies and hammer the shellfish against it.

Diet: Abalones, clams, crabs, fish, mussels, octopuses, sea urchins, and squids. Sea otters may eat as much as a quarter of their body weight daily.

Source: World Book Encyclopedia



MARTHA THERRY... DETROIT FREE PRESS



ASSOCIATED PRESS FILE PHOTOGRAPH

Vice President Al Gore paddled close to an otter while kayaking during an oceanic conference in Monterey in June.

Mystery surrounds decline of state's otters

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ened species list altogether by the turn of the century. But if the increase in otter deaths continues, this may not happen.

"It's very possible that at current rates of decline, we're looking at re-listing to endangered rather than delisting at 2000," said David Jessup, the veterinarian in charge of the Marine Wildlife Veterinary Care Center in Santa Cruz. "Not only have the California populations declined significantly over the last four years, but many of the Alaska populations have dropped by a decimal place in the last five to eight years. So worldwide, it's a pretty bad outlook for mister sea otter."

Tracking the sea otter population is an inexact science. Researchers and volunteers cover the California coast between Point Arena and Point Conception near Santa Barbara. They venture out in boats and sit in cars on shore to total up their sightings.

Southern sea otter numbers have fallen every year for the past four, according to biannual counts. From a high of 2,377 animals counted in spring 1995, otter numbers diminished to 2,114 in spring 1998, a loss of 11 percent over the three-year period. This year's fall count, completed in early November, registered only 1,937 animals, a 12 percent drop from last fall.

In contrast, observers recorded healthy increases of about 5 percent every spring from 1985 to 1995.

"Prime breeding-age adults are dying from disease," said Nancy Thomas, a veterinary pathologist for the U.S. Geological Survey, who has examined most of the dead otters found by the sea otter network from 1991 to 1997. Her research provided the first solid evidence into the likely causes of death.

Seeing many otters die at their reproductive peak disturbs biologists because it means the species is losing the individuals capable of replenishing the ranks. In most healthy animal populations, the very young and the very old should be the weakest and most likely to die.

"It's not clear whether otters are facing more exposure, or are unable to process what they are getting," Jessup said. So few necropsy reports and samples exist from before 1992 that it is difficult for researchers to tell whether death patterns and causes have changed since the decline began.

One known culprit

The fungus that causes a respiratory infection called San Joaquin Valley fever in humans is responsible for about 8 percent of the deaths in diseased otters, Thomas said. The spores of the fungus — *coccidioides immitis* — which grow in the inland desert soil, ride the wind from the San Joaquin Valley to the coast of San Luis Obispo and Morro Bay. Once inhaled by an otter, the fungus may invade the brain and cause fatal convulsions or comas.

A spiny-headed worm causes an additional third of the disease-related deaths. The hundred or more sharp hooks bristling around the worm's head rip holes in the otter's intestine. Bacteria stream through the holes and then infect the central body cavity, causing the otter to go into shock and die.

Otters probably ingest the worms by eating mole crabs, oval-shaped crustaceans that bury themselves in the surf zone sand to filter plankton and escape the probing beaks of predatory shorebirds. "The worms are programmed to parasitize the gut of a bird," said Kevin Lafferty, a researcher with the USGS. "They make mistakes in the otter which cause them to perforate the otter's intestine. This can be fatal for both the otter and the worm."

Lafferty suspects that crowding from the population increases of the late 1980s and early 1990s forced some otters to move from the kelp beds they favor to less bountiful sandy beaches, where they came into contact with worm-infested crabs.

Unfortunately, said Lafferty, the most effective way to combat this parasite is to eliminate shorebirds, an unacceptable alternative.

Some early information implicates a single-celled microorganism called toxoplasma in about 20 percent of the disease deaths. Toxoplasma is common in areas populated by many humans and their pets, because cats pass it in their feces, Jessup said.

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Jessup is capturing otters from Monterey to Santa Cruz to determine how deadly the microorganism is. "We're sampling blood from free-ranging animals," he said, "to see what percentage has been exposed to toxoplasma, and comparing that to the percentage that died of toxoplasma."

Although toxoplasma will survive in most mammals that come in contact with infected fecal matter, it generally causes problems only for animals with weak immune systems.

"This is one of the reasons we're concerned with the immune systems of sea otters," Jessup said.

Pollutants may be sapping the defenses of otherwise healthy otters, leaving them vulnerable to infections they would normally be able to resist, said Kurunthacha Kannan, an environmental toxicologist at the University of Michigan.

He and Thomas have found high levels of tributyltin, an ingredient in marine paint used to deter barnacles from attaching to boats and fishing nets, in many beached otters that died of disease. Otters that died of infectious diseases contained, on average, seven times more tributyltin than otters that died of trauma. Animals containing the highest concentrations of tributyltin, or TBT, were also more likely to be from areas with heavy boat traffic, such as harbors.

"People used to call this chemical the DDT of the 1990s," Kannan said. He and other researchers have found unusually high TBT concentrations in dolphins and seals that perished in mass die-outs in the mid-1980s. The amount the researchers found in otter livers was similar to concentrations found in diseased porpoises and dolphins.

To make matters worse, researchers say, otters and other marine mammals lack some of the enzymes that degrade TBT and other chemicals into less toxic compounds.

The federal government banned tributyltin in 1989 on vessels less than about 80 feet long because studies showed it caused reproductive problems and other disorders in oysters, snails and other organisms.

"We thought it would go away from the environment in two to three years," Kannan said. "Now it's been more than ten years since the restriction, and it's still in sediments."

This persistence is particularly ominous for sea otters, who prefer bottom-feeding prey such as shellfish and snails.

"The best we can say is that they were exposed to TBTs and it was associated with immunosuppression," Thomas said. "The one thing that complicates it is that you can't say this level 'X' means it's going to have an effect. I don't think there's any cause and effect information there."

Skeptical of evidence

James Estes, an otter researcher at the University of California-Santa Cruz, finds scant evidence that TBT and other chemical contaminants are hurting the sea otter population. "Widespread use of environmental contaminants has been relatively recent, in the 1960s," he says. "The otter population was behaving sluggishly through the '30s and '40s as well."

Estes said TBT may be endangering otters in Monterey Bay and other harbors that see lots of boat traffic, but not the entire population. He said more animals need to be studied to determine whether or not the correlation is real.

The hypothesis that TBT is contributing to otter deaths hasn't convinced Jessup either. "I think it does not explain all the problems we're seeing, but it's a wake-up call to look at whether the bio-accumulation of these contaminants has negative effects on health."

Mark Stephenson of the U.S. Fish and Wildlife Service is addressing this question by analyzing the levels of pollutants in otter favorites such as clams in Elkhorn Slough near Watsonville.

With a computer modeling program, Stephenson can estimate how large a dose of pollutants the resident otters ingest per day, and how seriously the chemicals harm the otter population.

Whatever the amount turns out to be, sea otters will be coping with it for a long time. "These pollutants don't decay much," Stephenson said. "They'll be around for the next 50 to 100 years in soils."