

**Written Testimony of
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**Before the
Subcommittee on Insular Affairs, Wildlife, and Oceans**

**Committee on Natural Resources
U.S. House of Representatives**

**Hearing on
H.R. 556, The Southern Sea Otter Recovery and Research Act**

Thank you for the opportunity to appear before the U.S. House of Representatives, Committee on Natural Resources, Subcommittee on Insular Affairs, Wildlife, and Oceans in order to provide written testimony in support of H.R. 556, The Southern Sea Otter Recovery and Research Act. The following account is an expanded version of the oral testimony I presented at the subcommittee hearing on 5 May, 2009.

My name is James A. Estes. I have spent much of the past 39 years designing and conducting research on sea otters and coastal marine ecosystems in California, Alaska, and Russia. I was employed as a research scientist with the Biological Resources Division of the U.S. Geological Survey (formerly the National Biological Service, and before that the Research Division of the U.S. Fish and Wildlife Service) from 1974 to 2008. I retired from federal service in 2008 and currently am employed as a Professor of Ecology and Evolutionary Biology and Director of the STEPS Institute at the University of California at Santa Cruz.

I must begin by emphasizing that many individuals and organizations are involved with the conservation and management of sea otters in California. These individuals have formed an alliance, known as the Southern Sea Otter Research Alliance¹, for the purpose of supporting research, discussing unresolved or controversial issues, and providing a unified view of research and conservation needs for the California sea otter. This alliance includes representatives from academic institutions, state and federal agencies, non-governmental organizations, and the private sector. I am providing this testimony both as a concerned scientist and as a representative of the Southern Sea Otter Research Alliance.

¹ Members of the Southern Sea Otter Research Alliance represent the following organizations: California Department of Fish & Game, Defenders of Wildlife, Friends of the Sea Otter, Marine Mammal Center, University of California at Santa Cruz, University of California at Davis, Monterey Bay Aquarium, U.S. Geological Survey's Western Ecological Research Center, U.S. Fish & Wildlife Service

In an effort to bring the key issues underlying H.R. 556 into focus, my testimony is organized around what I see as the central questions you should be asking yourselves about the challenges and needs for conserving and managing southern sea otters, and about the extent to which this bill is likely to meet and fulfill those challenges and needs.

One of the largest potential points of concern about conservation and management efforts that focus on a single species in a single place is the question of relevance and context. The Earth supports some 5-10 million extant species of plants and animals, many of which are threatened with extinction because of the large and growing human footprint on global land- and seascapes. Why, then, do California sea otters warrant specific federal legislation? Shouldn't government agencies and philanthropic organizations be directing their attention and resources to the broader problem of preventing extinction and maintaining biodiversity?

California sea otters deserve special attention for three reasons. The first is that sea otters are what ecologists call a *keystone species*. As the term implies, keystone species hold ecosystems together, just as an arch's keystone prevents it from collapsing once all the other stones have been put in place. These keystone roles are now understood for a variety of large predators and their associated ecosystems. For instance, gray wolves, by limiting elk and deer, prevent destructive overgrazing, thus facilitating the regeneration of forests and forest wildlife. These interactions lead to various important ecosystem services, such as the maintenance of water tables and the prevention of stream bank erosion, increases in song birds, and even the reduced risk of Lyme disease. In another example, great sharks on the eastern U.S. seaboard play similar keystone roles by controlling populations of small skates and rays, in turn enhancing clam beds and oyster reefs which support important fisheries and help maintain water quality by their filtering actions. Other examples from around the world are known or suspected.

Sea otters play this keystone role in coastal marine ecosystems by preying on herbivorous sea urchins, which in turn feed on kelp and other marine algae. When sea otters are present in sufficient numbers, sea urchin populations are held in check and the kelp forest is thus able to thrive. In contrast, sea urchins often erupt in coastal ecosystems of western North America that lack sea otters, leading to destructive overgrazing and deforestation. This ecological chain reaction from sea otters to sea urchins to kelp, a process referred to more generally by ecologists as a *trophic cascade*, has numerous important influences on other species and ecosystem processes. For example, like plants on land, kelps are important primary producers, combining water, nutrients and carbon dioxide with the sun's energy to fuel life in the coastal oceans. Hence, coastal ecosystems with sea otters are 3-4 times more productive than are similar systems lacking sea otters. Kelp forests also provide habitat for a plethora of marine life, just as terrestrial forests provide critical habitats for birds, insects, and other terrestrial wildlife. Finally, kelp forests protect the shore from waves and currents, reducing erosion and holding coastal recession and the loss or damage of coastal property in relative check. By way of these various interactions and processes, the sea otter's loss would lead to an unraveling of California's coastal ecosystems.

A second reason for focusing attention on sea otters is that they are bellwethers of ecosystem health. As sea otters go, so go many other species in the coastal oceans of central California. This is due in part to the sea otter's high trophic status (thereby reflecting disturbances to species below them in the food web) and in part by the fact that the population is easily sampled and monitored. The California sea otter population has been systematically counted using a standardized method for nearly 30 years. Hence, any future changes in their distribution and abundance will be easy to detect. Living animals can be captured and sampled with little risk or difficulty, thus providing materials for health screening. And an estimated 50% or so of the deaths are found as stranded carcasses on the adjacent shores. These carcasses provide not only a crude index of mortality rate but a source of material for conducting necropsies to determine causes of death.

And third, like pandas and snow leopards, the sea otter is iconic. The general public is acutely aware of sea otters and concerned about their welfare. The mere existence of sea otters and the opportunity to observe them in nature bring pleasure and richness to peoples' lives. This pleasure and richness is an important drawing point in central California's tourism industry, which was estimated in 2004 to be worth more than 2.5 billion dollars.

The mere fact that sea otters are ecologically and socially important doesn't necessarily warrant spending more public money on them. Justification for such expenditures requires some sort of existing or anticipated concern, the need for information to better understand the concern (research), or a means of applying what is already known to resolve the concern (management).

Are there concerns over California sea otters, and if so what are they? Of primary concern is the fact that the population is not recovering. Sea otters once abounded across the rim of the North Pacific Ocean. Until just several hundred years ago the world population contained a million or so animals, including some 16,000 in California waters. These animals were hunted to the brink of extinction during the Pacific maritime fur trade. By the early 1900s only a few remnant colonies survived, including about 50 individuals along the then-remote Big Sur coastline of central California. With protection, most of these colonies rapidly recovered. For example, in southwest Alaska's Aleutian archipelago, sea otter numbers grew from a hundred or so individuals at the beginning of the 20th century to nearly a hundred thousand by the 1980s. Sea otter numbers in California also increased, but much more slowly. Nonetheless, population growth progressed steadily from the time of the sea otter's protection in 1912 until about the mid 1970s. The population took a distinct downturn in the mid 1970s due to increased incidental mortality in a growing coastal set net fishery. Once this problem was identified and mitigated, population growth resumed, and by the early 1990s there was wildly held anticipation that the California sea otter would be delisted as Threatened (as it is currently listed under the Endangered Species Act) before the turn of the 21st Century. However, that did not occur because further population growth mysteriously stopped by about the mid 1990s and since that time it has remained roughly stagnant. The reason for both the earlier sluggish recovery and the more recent attenuated population growth is unclear.

My concern is that these phenomena are a result of the ratcheting effects of habitat deterioration on sea otters—i.e., anthropogenic environmental forces that are preventing sea otter population recovery that, if left unchecked, will only worsen with California's growing human population and the resulting impacts on this increased humanity on our coastal oceans. We should all wonder—will the California sea otter recover, or is it on the cusp of turning toward the slide to extinction?

The conservation and management of sea otters are made all the more complex by conflicting interactions between sea otters and shellfisheries. These conflicts occur in two ways. First, sea otters are incidentally entangled or entrapped in fishing nets and pots. As explained in the preceding paragraph, a substantial decline in the California sea otter population from the mid 1970s to the early 1980s was caused by entanglement losses in a developing shallow water gill net fishery. Sea otters are also known to become entrapped and drown in pots and traps set for crabs, lobsters, and fish. Although there are few recent reports in central California, such losses are difficult to document and their magnitude and related population impacts are unknown. Second, sea otters compete with humans for shellfish. Large shellfish (abalone, sea urchin, crab, clam and lobsters) stocks developed in the coastal waters of the North Pacific Ocean following the sea otter's demise in the maritime fur trade. Various commercial and recreational fisheries grew up around these newly formed resources. Sea otter recovery has and will continue to conflict directly with these fisheries. However, there are other dimensions to this issue. One is the many beneficial influences of sea otters on ecosystem structure and services, which are described briefly above. Further, the degree to which at least some of these fisheries are sustainable remains an open question. Although they should all be sustainable with proper management, in fact a number of shellfisheries have collapsed in the absence of any influence from sea otters. The abalone fishery in southern California is a case in point. Abnormally high shellfish densities also seem to have promoted the spread of disease and parasites, reaching epidemic levels in some cases.

Exactly what do we know about the California sea otter's failure to recover? Broadly considered, trends in the abundance of any population determined by just three general processes—reproduction, mortality and redistribution. The California sea otter's failure to recover is not influenced in any way by reproductive suppression. I can make this very strong claim because we know, from years of study, that the age of first reproduction and age-specific reproductive rates in California sea otters are similar to those of sea otter populations elsewhere that are doing well. Similarly, the California sea otter's failure to recover cannot be a result of emigration. Were that so the missing animals surely would have appeared elsewhere, which is not the case. This leaves elevated mortality as the only possible explanation. It also leads to two conclusions with regard to the priorities of research and conservation. First, the principal research need for California sea otters is to understand the specific causes of mortality, and 2) that the goal of management should be to mitigate the cause or causes that are anthropogenic in nature.

Much is already known about mortality in California sea otters. We know that these animals die from a host of causes including disease, starvation, entanglement/entrapment in fishing gear, shark predation, biotoxins, shooting and boat strikes. We also know that

body condition has declined and that mortality rate has increased over the past several decades. We know that roughly 40% of the stranded carcasses die from parasites and infectious diseases. Furthermore, we have reasonably strong evidence that food resources are chronically limiting to sea otters in central California, and that this condition has worsened over the past few decades as mortality rates have increased. We know that various anthropogenic contaminants, such as DDT and PCBs, occur at significantly higher levels in California sea otters than they do in sea otters in Alaska.

However, many key features of mortality in California sea otters remain unknown. We do not know whether the seemingly high numbers of otters dying from parasites and infectious diseases has increased or remained constant over the years because detailed information from necropsies are not available from before the early 1990s. We do not know if the comparatively high contaminant loads in California sea otters are toxic or in any other way debilitating to the animals. We understand very little about sources and significance of disease in California sea otters. In particular, we do not know if the seemingly high rate of mortality from disease and parasites is due to elevated pathogen exposure or increased vulnerability to these pathogens in animals whose defenses have been compromised by food limitation. Equally problematic is our uncertainty in the degree to which the stranding records are representative of mortality in the wild California sea otter population. Although the stranding program's ability to account for nearly half of the deaths is remarkable for a wildlife species, sea otters must haul out or drift ashore to be found and we do not know if those that are not found are dying for different reasons or in different proportions. In short, although much is already known about the California sea otter, we lack a clear and defensible sense of the management actions necessary to preserve and recover this population. Further information is required to establish an active and well-informed recovery effort.

What specific information is needed to better inform management on the cause or causes of mortality in California sea otters, and how can that information be obtained? Simply continuing to monitor the number of living animals and the number and cause of death in the stranded carcasses is necessary but not sufficient. What is needed, in addition, is a clearer and more representative view of mortality. And that can only be obtained by more detailed study of the wild population.

Can an understanding of sea otter mortality be obtained with reasonable certainty, at a reasonable cost, and within a reasonable length of time? The answer is yes, very likely. We already have the technological capabilities of capturing, tagging, and closely following tagged animals in the field. Furthermore, tagging and tracking technology is improving rapidly. The financial resources needed to conduct this work, while not trivial, are also not prohibitive. The proposed research funding under H.R. 556, when added to existing resources, is sufficient to maintain the monitoring program and expand the field research, as I have briefly described above. A five year commitment will provide a greatly clarified view of why California sea otters are dying at elevated rates. This information, in turn, is essential to mitigating the problem and recovering the population.

The U.S. Fish & Wildlife Service's 2003 Recovery Plan for the southern sea otter recognized these issues and identified the need for a variety of research on sea otters and their associated coastal ecosystems. In response to the Recovery Plan's charge, a research plan for obtaining the information deemed vital to the conservation and management of California sea otters is available and ready for implementation. This plan was formulated in 2007 by an ad hoc committee (made up of 9 independent scientists from academia, government, and the private sector) of the U.S. Fish & Wildlife Service's Southern Sea Otter Recovery Implementation Team. The resulting research plan for recovery of the California sea otter, which is available from the Service's Ventura field office, provides a consensus view of essential research needs. All that remains to implement this research is the necessary funding.

Finally, besides the many needs for information, is this bill really required to make that happen? The answer in my view again is yes. Although federal, state and private programs are already in place for sea otter conservation, none of these provide the necessary financial resources required by scientists and managers to answer the key questions and institute an effective recovery program for the California sea otter. FWS has authority under both the Endangered Species Act and the Marine Mammal Protection Act to provide funding and to institute conservation and management actions. However, they have yet to act under either of these authorities and are unlikely to do so without significant added funding. The U.S. Geological Survey is responsible for conducting research on DOI trust species and in fact the Survey's Western Ecological Research Center (and its various predecessors) have maintained a sea otter research program in central California for many years. However, as operational costs are increasing, the agency's base financial allocations to the California sea otter project have declined and I expect they will continue to do so without a specific mandate from Congress or the White House. The State of California's authority for sea otter research and management is superseded by federal authority. Some funding is provided through a State income tax checkoff, but to date these funds have been insufficient to support the program and given the current economic climate in California, their future is uncertain. The private sector has contributed to sea otter research and recovery efforts in various ways, but these organizations cannot be expected to provide funding for what they see as a mandate of the responsible federal agency.

In concluding this testimony, I would like to return to the more general relevance of California sea otters to wildlife conservation and natural resource management. The challenge faced by natural resource managers and conservation scientists everywhere is preserving biodiversity in the face of the growing needs and numbers of people. While human population growth has slowed or ceased in many parts of the first world, it is still increasing along the western seaboard of the United States. The 20th century witnessed more than a 25 fold increase in California's human population; that trend is projected to continue for the foreseeable future; and the great majority of these people will continue living along or very near the coast. We must therefore ask--Can the functional integrity of California's coastal marine ecosystems be preserved in the face of these changes? More to the point of this hearing and the proposed legislation, can we save and recover the California sea otter in a coastal ocean that is ever-more influenced by increasing human

numbers and changing technologies? While these questions might seem to be of only localized interest or relevance, they are in fact of national and even global significance. Large predatory species and their ecological roles have been disproportionately lost or are in jeopardy of being lost throughout the world. The U.S. Oceans Commission and the Pew Oceans Commission independently concluded that the world's oceans are threatened by pollution, overuse, and habitat degradation. Sea otters and the coastal ocean of central California are a line in the sand, a testing ground and an exemplar for the preservation and restoration of these valued and valuable resources everywhere. If we cannot save a species like the sea otter in a place like central California, what hope is there for imperiled wildlife anywhere?