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Subcommittee on Fisheries, Wildlife, Oceans and Insular Affairs
House of Representatives Committee on Natural Resources

Testimony on H.R. 4043
"Military Readiness and Southern Sea Otter Conservation Act"

I would like to thank the Chairman and Members of the House Natural Resources Committee Subcommittee on Fisheries, Wildlife, Oceans and Insular Affairs for inviting me to provide information and comment on bill H.R. 4043 and on efforts to foster recovery of the southern sea otter under the ESA. I have provided the Committee staff with my resume [1] and a list of my writings on marine pollution, marine ecosystem health, and health/disease discoveries and issues involving marine birds and mammals, particularly sea otters, which form the basis for much of my testimony. I earned a BS in Zoology at the University of Washington in 1971. After receiving my DVM from Washington State University veterinary school in 1976, and spending 10 months in a pathology residency at the University of California-Davis, I was hired by the California Department of Fish and Game (CDFG) as its first wildlife veterinarian. I served CDFG in various capacities for more than 33 years, the last 15 in Santa Cruz, California, as Senior Wildlife Veterinarian and Supervisor of the Marine Wildlife Veterinary Care and Research Center. During my career I took time out to earn a Masters degree in Epidemiology and Preventive Medicine at U.C. Davis and get Board certified in Zoological Medicine. I retired from CDFG in November 2010 and was hired as Executive Manager of the Wildlife Disease Association (WDA) an international non-profit scientific organization. The testimony I am providing does not necessarily reflect the opinions or policies of either my past or present employers.

Background: I believe the committee and their staff are aware that the southern sea otter (*Enhydra lutris nereis*) was listed as threatened under ESA in 1977. This subspecies lives only in California waters from just south of San Francisco to just north of Santa Barbara with a small transplanted population around San Nicolas Island, the furthest west of the Channel Islands. The 2010 counted population was 2719 animals. Weather problems prohibited completion of the scheduled Spring 2011 range-wide count; the 2012 count should begin within the next 30 days. Under the current recovery plan, delisting would not be considered until the running average for the mainland otter population count exceeds 3090 for at least three successive years.

From August 1987 to March 1990, in an effort to reduce the risk that a catastrophic oil spill might cause the extinction or near extinction of the mainland population, 140 sea otters were relocated to the waters around San Nicolas Island under conditions laid out in Public Law 99-625. Very few of them, less than a dozen, stayed more than a few weeks. The management of that San Nicolas Island population is one focus of HR 4043.

The average rate of sea otters population increase was about 4 percent per year from 1979 to 1995, except for a three to four year period when adult mortality, primarily due to a gill and trammel net fishery that was restricted and then closed, caused a dip in that growth. From 1995 to the current date southern sea otter population performance has been erratic with some periods of decline, growth, stasis and again decline. At this same time the population has not expanded geographically, or expansions have been temporary and followed by contractions. It is also worth noting that sea otter populations in California, even under the best conditions have only grown at 4 to 5 percent per year, never approaching the 17 to 20 percent per year growth rates recorded in Alaska, British Columbia and Washington State.

For the last six to seven years, an average of 10 percent of the existing populations (over 200 otters per year) were found dead on California beaches. Estimates are that as few as 50 percent of total dead otter carcasses may be recovered. With a nearly 40-year history of collecting and examining carcasses, and a 20-year history of intensive veterinary postmortem examination of selected fresh-dead otters, the “death assemblage” for southern sea otters is more extensive than for almost any other marine species. Data is available on over 6400 southern sea otters.

There is scientific consensus that adult sea otter mortality in prime age classes, particularly adult female mortality, is the reason the population is not growing as it once did. The reasons for sea otter mortality are complicated and there is some year to year variation. In the last two years, great white sharks have killed more sea otters than at any time in the last four decades, and it isn’t clear whether neurologic damage from anthropogenic pathogens and toxins may be a predisposing factor. An “end lactation syndrome” has been described that affects females that are malnourished, right at the end of lactation (raising a pup), who then suffer significant physical trauma during mating. Because it affects females in prime mating years, this syndrome has an outsized affect on population performance.

Incidental take (boat strike, fishing gear entanglement, gunshot) are consistently causes of mortality (a few percent per year). Major and consistent human-related contributors to sea otter mortality are various pathogens, toxins and contaminants that are apparently coming from land-based sources, and thus are forms of pollution. [2,3] One analysis of 21 fresh-dead sea otter carcasses from to 1998 to 2006 revealed that 52 percent had, as the cause of death or one of the top two contributors, one of five diseases or toxins now known to be connected to human source pollution. Food limitation, which is evidenced by prey shifting, also predisposes

sea otters to disease, as less preferred prey are often filter-feeding bivalves that concentrate toxins and pathogens. We have shown that sea otters eating filter feeding bivalves in Monterey Bay have a 24 percent increased risk of infection with the protozoal parasite *Sarcocystis neurona*, which is shed in the feces of opossum, an invasive species introduced to California in the last 100 years. Those otters eating primarily abalone are protected from infection by that parasite and *Toxoplasma gondii*, a parasite shed by cats [4]

With regard to disease exposure, to some extent sea otters "are what they eat"; filter-feeding bivalves disease organisms, but also biotoxins and chemical pollutants,[5] and the effects of disease should not be divorced from food limitation.

Comment on HR 4043: The Sea Otter Conservation and Military Readiness Act

The bill, introduced by Congressman Gallegly, has as its stated purpose "to enhance conservation of the southern sea otter and its growth toward an optimum sustainable population while allowing reasonable assurances for military readiness." Most aspects of the bill as written appear to support those purposes.

The establishment of Southern Sea Otter Military Readiness Areas, in the waters around San Nicolas Island, Begg Rock, San Clemente Island and off Camp Pendleton, where certain aspects of ESA and MMPA would be modified or suspended should not pose a significant risk to sea otter population recovery. Under PL 99-625 otters moved to San Nicolas Island were designated a nonessential experimental population. The otters adjacent to San Nicolas Island have been successfully managed under provisions of the Sikes Act for more than two decades, having more than tripled in number (from about a dozen to 48 independent animals and 10 pups in March 2012). Although this is not optimal growth over 25 years, given the abundance of food resources, there is no evidence of significant mortality associated with military activities or inadequate management.

However, in my opinion, it would be unwise for the Navy to take over monitoring the sea otter population adjacent to San Nicolas Island and do it only every three years as provided in HR 4043. The population is still small, approximately 50 animals. Currently USGS is more intensively monitoring the San Nicolas Island population with three to four surveys per year. Very infrequent monitoring (every three years) could result in major events, such a die offs, major movements or range extension going unrecorded. Monitoring has been done by USGS using consistent methods over more than two decades and there have been no significant conflicts or problems between sea otter researchers and military activities on San Nicolas. Major changes in frequency or methods of monitoring now would likely result in incomparable data sets and raise the specter of "bad science." It would seem wiser, for the Navy to contract with or agree to have USGS continue to monitor the populations as it has been doing, yearly.

The provision in HR 4043 (c) that there be “no removal of sea otters within the Readiness Areas under this section or any other federal law.” seems wise, reasonable and indeed promotes the conservation and recovery of the southern sea otter. However, that contrasts with section g (3) that requires the Secretary of the Interior to continue to manage southern sea otters under the provisions of PL 99-625 for some period of time, possibly a number of years. That could be interpreted as requiring the removal of the sea otters south of Pt. Conception (in the “no otter zone”), except those around San Nicolas Island, if the translocation is deemed a failure.

The southern sea otter population south of Pt. Conception now consists of more than 100 sea otters including many adult females with pups. Female otters captured, measured, tagged and sampled under USGS research permits in March 2012 were in excellent condition and were breeding, pregnant or had pupped previously. Once adult females begin those activities, they do not willingly move long distances. It appears the core sea otter population has moved further south, very likely permanently. For the last decade a group of male transient sea otters had periodically moved into the Cojo moorage area north of Gaviota and even gone as far south as Coal Oil Point. This was not considered to be permanent expansion of the core range. Nevertheless, the sea otter population south of Pt. Conception now has a very significant adult breeding-female component.

HR 4043, Section g (1), which requires an “Ecosystem Management Plan” that ensures recovery of the southern sea otter, and recovery of the black abalone (*Haliotus carcherodii*), and the white abalone (*Haliotus sorensenii*), and a sustainable shellfish harvest, is unfeasible. The marine ecosystems inhabited by those species encompass hundreds of miles of diverse ocean, a great deal of which is not geographically continuous (sea otter and white abalone habitat, as well as sea otters and some black abalone habitat and some shell fishing grounds) and contains thousands of species with interlocking ecological relationships. Providing a management plan for just one of the ESA listed species mentioned in HR 4043, in the context of its ecosystem, is a massive undertaking.

It is well established that healthy kelp forests provide conditions for greater fish and shellfish species diversity. Kelp forests also protect coastlines from storm surge and sequester massive amounts of carbon. Sea otters are well known as a “keystone species” as they help keep kelp forests healthy by preying on those species that eat kelp. Kelp and fragments of dead kelp serve as food for sea urchins and abalone. Maintaining healthy kelp forests would seem to be a potential common cause for fishermen, some shellfish harvesters, conservationists and sea otter advocates.

Coastal pollution can directly affect shellfish health, harvest and marketability, as well as predisposing the system to harmful algal blooms. Indeed, addressing causes of marine pollution is another area where shell fishers, conservationists and sea otter advocates may have common

cause. So it is helpful that water quality as a factor effecting sea otters and other coastal marine species is briefly recognized in HR 4043 g(2). Expansion on this and funding for research and mitigation efforts would be welcome and could benefit not only the people potentially affected by this bill, but the entire populace that uses and depends on clean oceans.

The decline of black abalone and white abalone populations had nothing to do with sea otters. So, it makes little sense to require USFWS to develop an ecosystem management plan that will ensure the recovery of the black abalone and the white abalone and the southern sea otter since their recovery challenges have relatively very little to do with one another. Unless the real causes of those declines (see comments below on black and white abalone, and above on sea otters) are dealt with, no management actions that can be taken with sea otters will have much effect. Also, the term ”ensure” suggests a level of control that exceeds that of the Federal government, and that in my mind at least, borders on the divine.

The growth and reproduction of shellfish (thus potential future harvest) is dependent on many large uncontrollable forces like ocean temperature, pH, nutrient levels and plankton blooms. Shellfish harvest (which may include such diverse species as abalone, lobster, crab, sea urchins, octopus, squid, clams of all types, etc) is not under Federal control, unless the species are listed under ESA (like the black and the white abalone). These fisheries are generally managed by the State of California under the Fish and Game Code. Overharvest, and CDFG regulations to limit it, can be a major factor affecting subsequent shellfish harvest in any year or series of years. Shellfish harvest relies on a sustainable surplus of larger adult organisms and this is often not the same thing as a healthy reproducing population (see comments on shellfish harvest below). When sea otters move into a new area they can have fairly quick negative impacts on some harvested species, but such factors as global climate change and ocean acidification can have greater and longer-term consequences than sea otters. There is very little that USFWS and NOAA, can do to maintain or even significantly influence shellfish harvests. Section g does nothing for sea otter conservation or military readiness, and I would recommend dropping it from the bill.

PL 99-625 reflects a level of understanding of sea otter biology and management that is several decades old. The concept, that sea otters can be excluded from areas of the ocean they want to occupy, has proven unworkable, and now seems a bit foolish. The projection that sea otters would rapidly colonize the waters around San Nicolas Island and reach a carrying capacity of several hundred animals in a decade now seems terribly optimistic. The effects of pathogens, toxins and other pollutants, and the interaction between these mortality factors and food limitation, were not known at the time. Sea otters simply did not behave as predicted 25 years ago. It is now very clear that natural expansion of the mainland range population will be necessary for population recovery goals to be met.

Requiring USFWS to come up with a plan to **ensure** southern sea otter recovery, black abalone recovery, white abalone recovery and maintenance of shellfish harvest at current levels, which is essentially a promise, does not seem at all likely to succeed or to build trust with the fishing community. Further, it would prolong the reliance on PL 99-625, a very flawed piece of legislation. If HR 4043 contained language recognizing that prohibition of sea otter movement and range expansion under PL 99-625 is impossible, and that containment efforts should be ended, it would better serve sea otter conservation. And, it would neither hurt nor help shell fishers as these provisions of PL 99-625 are not, cannot, and will not be enforced. This seems to be a case where making fewer, rather than more promises, would be wise.

Black abalone: The reasons for the decline of both abalone species to the point they were listed under ESA had essentially nothing to do with sea otters. Black abalone, which were once extremely numerous throughout the Channel Islands and elsewhere in the range of the southern sea otter, were the object of a sustainable commercial and sport fishery, but were devastated by the introduction of a novel disease organism , the rickettsia *Xenohaliotis californensis*, in the mid 1980s. The organism infects and severely damages the lining of the digestive tract and inhibits the uptake of nutrients, and the abalone slowly shrinks or withers away, hence the disease it causes is called “withering syndrome.”

Epidemiologic analysis suggests the site of introduction of the organism was in the Channel Islands a year or so prior to its discovery in 1984. At that time there no sea otters in the Channel Islands and none south of Pt. Conception. Yet black abalone mortality was extremely high, approaching 100 percent in affected areas. Those abalone populations have not recovered in the intervening decades, again, even in the effective absence of sea otters preying on them. The spread of withering syndrome was at first inexorable, but the northward progression slowed, apparently in response to colder water temperatures, and has stalled near the Big Creek area the Big Sur coast. Along the Big Sur coast and northward sea otters and black abalone coexist in balance.

Even large healthy sea otter populations do not threaten healthy black abalone populations. Otters certainly prey on black abalone. They take the largest and easiest to find, just as sport and commercial harvesters do. However, plenty of small but reproductively competent abalone live in unreachable (even by sea otters) crevices and rock piles. Sea otters do not destroy abalone populations, but they can contribute to reduction of viable abalone (and urchin) fisheries.

Withering syndrome also affects other species of abalone (including white abalone), although not as severely as black abalone. It is believed to have been brought to California via ballast-water discharge, northward incursion of a tropical carrier species, or as a result of aquaculture. It can be seen as a form of pollution or as an invasive species issue, but it has all the devastating

characteristics of a “virgin soil epidemic,” it spreads quickly, is highly lethal, is persistent, and can cause ecosystem level effects.

Unless or until “withering syndrome” is stopped, black abalone populations are unlikely to recover, whether or not sea otters are present. Since water temperature is a factor that can slow or stop the disease, things that exacerbate increased ocean temperatures are far more likely to inhibit recovery than sea otters. Also, since abalone depend on their shells for protection, increasing pH, which can be caused by increasing carbon dioxide in the atmosphere can be seen as another looming threat.

White abalone: White abalone are generally found in warmer waters of Southern California from about Santa Barbara south to Baja Mexico. Sea otters have not inhabited those areas for over 200 years. The white abalone is a deep-dwelling and slow-reproducing species. Overharvesting and pollution are the primary acknowledged reasons for their decline. Sea otters are somewhat limited in the depths to which they can dive and, just like black abalone, white abalone can live in crevices and between rocks where sea otters can’t get them. It is rare for predators, except human beings, to drive their prey species to extinction.

Shellfish harvest: This is a rather general term that, as noted above, in the California waters under consideration, may include such diverse species as abalone (various species), lobster, crab (several species), octopus, squid (various species), sea urchin (two types), clams of several types, mussels, etc. These species have widely varying life histories and life cycles. Red abalone, for example, may take a decade to reach harvestable size, squid or clams a year or so. The ocean conditions that determine what a sustainable harvest may be vary greatly from year to year. By definition, a sustainable harvest of any single shellfish species is that which exceeds the population needed for the reproduction and growth of that population. If it were not an excess, its harvest would not be sustainable. Harvest regulations, largely under the State Fish and Game Code are meant to maintain a harvestable surplus and these regulations are periodically adjusted to do just that.

Shellfish fisheries rely on a harvestable surplus, usually of large mature individuals, in areas that are accessible. Predators, like sea otters, will preferentially take large mature shellfish of those species they prefer. In the presence of predators (arguably the natural condition) there are almost always fewer harvestable shellfish than in the absence of predators. When they move into an area where they have not been for many years the effects can be marked. Changes in the Pismo clam harvest following the sea otters’ move south from Morro Bay are often cited as an example, although there is controversy as to how much was related to sea otters and how much was related to ocean conditions. That does not mean that healthy reproducing populations of these shellfish and predators can’t co-exist. Indeed, the fact that they can and do is the basis for life in the ocean.

Sea Otters and jobs: Sea otter range expansion may negatively effects jobs related to urchin and perhaps some other fisheries. However, economic studies forecast increased direct income to Santa Barbara, largely from tourism, should sea otters expand to the south. The effect is projected to be an increase of from $1.5 million to $8.2 million per year, against fisheries losses of $610,240 (Economic Benefits of Expanding California's Southern Sea Otter Population. Loomis, J. 2005).

Thank you for the opportunity to present my testimony. I look forward to answering any questions that the Members might have.

1. Jessup, D.A. resume attached.

2. Jessup, D.A. Southern Sea Otters: Stuck in Recovery. Outdoor California, January 2011

3. Jessup, D.A, and M.A. Miller. 2012. Southern Sea Otters as Sentinels for Land-Sea Pollution. IN: Conservation Medicine: Applied Cases of Ecological Health. A. Aguirre, R. S. Ostfeld and P. Daszak, Eds. Oxford University Press, NY, 10016.

4. Johnson C.K., M.T. Tinker, J.E. Estes, P.A. Conrad, M. Staedler, M.M. Miller, D.A. Jessup, J.A.K. Mazet. 2008. Prey choice and habitat use drive sea otter pathogen exposure in a resource-limited coastal system. PNAS: Biological Sciences-Ecology 106(7); 2242-2247.

5. Kannan, K., H. Nakata, N. Kajiwara, M. Watanabe, N.J. Thomas, D.A. Jessup and S. Tanabe. 2003. Profiles of polychlorinated biphenyl congeners, organochlorine pesticides and butyltins in southern sea otters and their prey: Implications for PCB metabolism. Environmental Toxicology and Chemistry. 23(1): 49-56.

6. Jessup, D.A., M. Miller, C. Kreuder-Johnson, P. Conrad, T. Tinker,J. Estes, J. Mazet. 2007. Sea otters in a dirty ocean. Jour. Am. Vet. Med. Assoc. 231:11, 1648-1652