



*Environmental Seminar Series*  
*Presents:*

***California Sea Otters: Are They  
Trying to Tell Us Something About  
Marine Ecosystem Health?***

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**Date & Time: Wednesday, April 9, 2003, 5:00 PM  
Location: Smittcamp Alumni House**

**(Reception: 5:00 PM – Lecture: 5:15 PM)**

This program is open to all members of the professional, educational, and research communities. It is sponsored by: the Department of Earth and Environmental Sciences, with a grant from the College of Science and Mathematics. For additional information, please contact the Earth & Environmental Sciences Department office at (559) 278-3086 or email [venqieb@csufresno.edu](mailto:venqieb@csufresno.edu).

*Parking restrictions will be relaxed in Lot V (at Shaw and Woodrow Avenues) between 4:30 and 7:00 PM for seminar participants. An online campus parking map is located at: <http://www.csufresno.edu/univrelations/map/Default.html>.*

## ABSTRACT:

### California Sea Otters: Are They Trying to Tell Us Something About Marine Ecosystem Health?

Southern Sea Otters (*Enhydra lutris nereis*) are a federally listed threatened species restricted to the nearshore coast of California. The number of dead otters recorded has increased since the early 1990s. Pathogens, including bacteria, fungi, and protozoa typically associated with terrestrial animal and human disease, have been documented as a major (>40%) cause of otter mortality. Some of these infectious agents may be termed "biological pollution", entering the coastal marine ecosystem via some of the same routes as chemical pollutants. Sea otters are a keystone species in coastal communities, and can also be categorized as a sentinel species, as they may bioaccumulate biological pollutants by virtue of their habitat and their voracious appetites (25-30% of body weight consumed per day) for benthic filter-feeding invertebrates, which in turn may be responsible for removing and concentrating water-borne pathogenic organisms. Two protozoal parasites (*Toxoplasma gondii* and *Sarcocystis neurona*) have been found responsible for brain infections in otters, and have been the cause of ~10% of mortalities. Each of these parasites have terrestrial vertebrate definitive hosts, cats and possums respectively. The parasites have been detected and characterized in otters by isolation in cell culture, immunohistochemistry, and DNA amplification and sequencing. Sera from both dead and live otters has been tested for the presence of antibodies to the protozoa; 62% of dead otters and 42% of live otters from California were seropositive for *T. gondii*, which causes greater morbidity and mortality than *S. neurona*. A risk factor analysis of the sea otter population identified that *T. gondii* infection increases with age and sex (with males being more frequently afflicted), and is associated with coastal areas with profuse freshwater runoff, particularly the Morro Bay-Cayucos area. Investigations are continuing along multiple avenues including: 1) assessment of the ability of sea otter prey to bioaccumulate protozoa and other pathogens, 2) exploration of the relationship between sea otter mortality and *T. gondii* infection, 3) analysis of the differences between fatal and non-fatal infections, 4) monitoring sea otter scat for selected fecally-borne pathogens, 5) phylogenetic analysis of protozoa, and 6) analysis of the potential impacts of domoic acid from diatoms. These studies have important implications for sea otter health, human health, shellfish harvest and consumption, coastal water quality and marine ecosystem health, the impacts of agricultural runoff and sewage discharge, and coastal land use.