

Appendix O

Updated Information
Regarding
T. Gondii Impacts on Sea Otters

The following is an excerpt from page M-11 of the Year 1 Annual Report. This describes the program proposed in the Year 1 Annual Report to be implemented beginning in Year 2, to address this issue.

Recommended Program to Reduce or Eliminate the Sources of Toxoplasma Gondii Pollution Identified as Impacting Sea Otters Within the Jurisdictions of the MS4s Covered by the MRSWMP

The recommended program to be implemented beginning in Year 2 is directed at public education, and better identifying the locations of sea otter strandings and their proximities to storm water discharges, as described below.

1. The Public Education and Public Outreach program conducted under Minimum Control Measure No. 1, and the municipal staff training programs under Minimum Control Measure No. 6, will be expanded to provide education about the public health and marine environment risks associated with improper disposal of cat feces. The following would be included within the expanded educational program:

- Urge residents to regularly examine gardens and other areas on their property where free roaming cats are likely to defecate, and to pick up and dispose of cat feces with their solid waste that is sent to the sanitary landfill.*
- Direct public works personnel that routinely perform cleaning and maintenance of parks and greenbelt areas within communities to similarly pick up and dispose of fecal material that is found on public property in parks and other areas.*
- Urge cat owners to bag and dispose of cat litter and cat feces with their solid waste that is sent to the sanitary landfill, rather than flushing it down the toilet.*
- Develop an educational message to the public describing the feral cat implications on storm water pollution and its association with sea otter deaths.*
- Distribute educational brochures covering these topics at public events, veterinarian clinics, animal shelters, the SPCAs, and other suitable locations.*

2. Investigate the feasibility of assisting organizations within the area covered by the MRSWMP in publicizing or promoting their feral cat control programs.

3. Continue seeking to obtain geographic data on the locations of sea otter strandings associated with T. Gondii. If such data can be obtained in a format that can readily be used for mapping, develop a map of the coastline within the MRSWMP area showing the locations of strandings and their proximities to storm water outfalls.

On the following pages is a letter received from the Executive Director of The Otter Project, reporting that the scientific community is now of the opinion that the impact of

storm water discharges on Sea Otter health and mortality is not nearly as significant as previously thought.

Because of this updated information, and in order neither to mislead the public regarding the relationship between storm water discharges and the health of Sea Otters nor to expend precious resources on issues having little relationship to storm water pollution, the Group's work in Year 2 to educate the public on this matter will be limited to the following:

The Public Education and Public Outreach program conducted under Minimum Control Measure No. 1 will be expanded to provide education about the public health and marine environment risks associated with improper disposal of feces from pets and free-roaming animals. The following will be included within the educational program:

- *Urge residents to regularly examine gardens and other areas on their property where animals are likely to defecate, and to pick up and dispose of feces with their solid waste that is sent to the sanitary landfill.*
- *Urge cat owners to bag and dispose of cat litter and cat feces with their solid waste that is sent to the sanitary landfill, rather than flushing it down the toilet.*



The Otter Project

www.otterproject.org

August 17, 2008

Mr. Bob Jaques and Management Committee
Monterey Regional Storm Water Pollution Prevention Plan
5 Harris Court, Bldg D
Monterey, CA 93940

Dear Mr. Jaques and Committee Members,

The purpose of this letter is to follow up and formalize comments I have occasionally made in reference to your priorities, sea otters, pathogen pollution, and the *T. gondii* BMP in your plan.

It is our opinion that while pathogen (disease) pollution of our ocean is a serious problem for sea otters, the threat posed by the pathogen *T. gondii* is much less a problem than has been portrayed. We believe your more general efforts towards control of storm water and the reduction of chemical and pathogen contamination of storm water is a higher priority than trying to unravel the specifics of *T. gondii* pollution.

Our opinion is based on three scientifically validated assumptions:

1. *T. gondii* is nearly ubiquitous in our world's ocean. Local reductions will do little to reduce exposure to *T. gondii*.
2. There is little or no evidence that *T. gondii* is an increasing problem for sea otters.
3. There is new evidence that *T. gondii* is a FAR smaller threat to sea otters than was previously reported by some researchers.

The pathogen *Toxoplasma gondii* is nearly ubiquitous in our world's oceans.

Dubey, J.P. et.al. 2003. *Toxoplasma gondii*, *Neospora caninum*, *Sarcocystis*-like infections in marine mammals. *Veterinary Parasitology* 116:275-196
(<http://www.otterproject.org/atf/cf/%7B1032ABCB-19F9-4CB6-8364-2F74F73B3013%7D/bio%20pathogens%20in%20marine%20mammals.pdf>)

This extensive review found that exposure rates of sea otters to *T. gondii* was comparable to other marine mammals. In fact, some marine mammals (spotted seals) appear to be more often exposed than otters.



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There is little or no evidence that *T. gondii* is an increasing problem for sea otters. The single piece of significant research indicating that *T. gondii* is increasing is:

Kreuder, C., et al. 2003. Patterns of mortality in southern sea otters (*Enhydra lutris nereis*) from 1998-2001. *Journal of Wildlife Diseases* 39(3): 495-509
(http://www.otterproject.org/atf/cf/%7B1032ABCB-19F9-4CB6-8364-2F74F73B3013%7D/Kreuder_et_al_03.pdf)

A careful reading of Kreuder et al is required. A small note to table 1 indicates that sea otters were frequently given multiple primary causes of death by Department of Fish and Game biologists. A sea otter found drowned in a gill net was given two primary causes of death: drowning and *T. gondii*. Numerous shark bite cases were given two causes of death: shark bite and *T. gondii*. The assumption made by DFG biologists is that otters infected by *T. gondii* display erratic behaviors and are more susceptible other causes of death than otherwise healthy otters - an assumption never seen or verified in the field. The result of DFG's methodology is that mortality due to *T. gondii* is inflated while other causes of death are minimized. Kreuder compares her results against the results of Thomas et al:

Thomas, N.J. and Cole, R. The Risk of Disease and Threats to the Wild Population. In *Conservation and Management of the Southern Sea Otter*. 1996. *Endangered Species Update*. School of Natural Resources and Environment, Univ. of Mich. Vol. 13, No 12.

Thomas and Cole do not ascribe multiple primary causes of death. Dr. Thomas from the US Fish and Wildlife Service National Wildlife Health Center has complained to DFG that her results are not comparable to the Kreuder results. In fact, if the Kreuder results are re-interpreted (shark cases and drowning cases are not given a secondary cause of death) the Kreuder and Thomas results are nearly identical.

There is new evidence that *T. gondii* is a FAR smaller threat to sea otters than was previously reported by some researchers. A recent paper:

Thomas, N.J., J.P. Dubey, D.S. Lindsay, R.A. Cole, and C.U. Meteyer. 2007. Protozoal Meningoencephalitis in Sea Otters (*Enhydra lutris*): a Histopathological and Immunohistochemical Study of Naturally Occurring Cases. *Journal of Comparative Pathology* 137:102-121.
(<http://www.otterproject.org/atf/cf/%7B1032ABCB-19F9-4CB6-8364-2F74F73B3013%7D/Thomas%20et%20al.-Sea%20otters-final.doc.pdf>)

This study found that *T. gondii* was far less important as a cause of death in sea otters than previously suspected. In fact, the authors state, "We conclude that the sea otter is not highly vulnerable to *T. gondii*. Thirty-nine out of 344 total cases studies were diagnosed as death by protozoal meningoencephalitis. Two of the 39 (or 2 of the 344 (one half of one percent)) were ascribed to *T. gondii*."

Given this more careful read of past results and the new studies, we feel that spending resources to reduce sea otter mortality due to *T. gondii* is not warranted. We feel that a more general approach of reducing contamination of storm water - both chemical and pathogen - is more appropriate.

Sincerely,



Steve Shimek
Executive Director