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# Detection of *Toxoplasma gondii* in Feral Cats in Central Coastal California (Abstract)

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**ABSTRACT:** *Toxoplasma gondii* is a zoonotic apicomplexan parasite that can cause severe morbidity and mortality in warm-blooded animals, including marine mammals like the southern sea otter (*Enhydra lutris nereis*). Felids, including free-ranging domestic cats (*Felis catus*), can shed environmentally resistant *T. gondii* oocysts in their feces. Contamination of nearshore waters can occur following surface runoff that mobilizes oocysts from contaminated soil to water bodies. These oocysts can concentrate in invertebrates like sea urchins, oysters, and marine snails, which are common prey for otters. Certain genotypes of *T. gondii* (Type X and X variants) are associated with a higher likelihood of fatal infection in sea otters, and some of these genotypes have previously been isolated from felid tissues in the greater Monterey Bay region. However, *T. gondii* genotypes identified in tissues may differ from parasite genotypes in feces due to the possibility of mixed *T. gondii* infection in free-ranging cats and variable propensity of different strains to induce substantial oocyst shedding in domestic cats.

An estimated 1% of domestic cats may shed oocysts at any point in time, but studies of shedding frequency have historically focused among owned cats and in controlled (e.g., laboratory) settings. Free-ranging cats (cats that are unowned and live outdoors) have many behavioral characteristics that would make them more likely to shed compared to pet cats. There is limited knowledge on the frequency of oocyst shedding and genotypes of oocysts shed by free-ranging cats in their feces despite their large population sizes and ability to contribute to environmental oocyst contamination. Identification of specific categories of cats as sources of atypical genotypes of *T. gondii* associated with mortality in sea otters can help guide management actions to reduce contamination and risk of infection to endangered marine mammal populations. Therefore, we established a field study of free-ranging cats in central coastal California to understand 1) how oocyst shedding prevalence varies over time, and 2) to characterize genotypes of *T. gondii* shed in free-ranging cat feces.

Utilizing a longitudinal field study design at four free-ranging cat colonies, we are determining oocyst shedding prevalence over a two-year period using microscopy and PCR. Samples confirmed as *T. gondii* using sequence analysis are genotyped using multi-locus sequence typing (MLST) at 13 polymorphic loci. Monthly fecal sampling took place between July 2020 and August 2022. *Toxoplasma gondii* DNA was confirmed in several samples at ~10% prevalence. Several genotypes of *T. gondii* have thus far been identified in the sampled feral cat feces, including atypical genotypes of *T. gondii* previously associated with fatal infections in sea otters (Type X and X variants). Our study helps to fill in key gaps about the contribution of free-ranging cats to environmental contamination with *T. gondii* and provides additional evidence of these cats as a source of atypical genotypes associated with otter deaths. Free-ranging feral cats can contribute to biological pollution of the marine environment, and proper management of these animals could play an important role in reducing environmental contamination of oocysts and subsequent *T. gondii* infection in endangered marine mammals.

**KEY WORDS:** *Enhydra lutris nereis*, *Felis catus*, feral cats, oocyst, parasites, sea otter, *Toxoplasma gondii*