

Science Talk: *Leptospira* in the Marine Ecosystem

Leptospirosis is an infectious disease caused by pathogenic members of the genus *Leptospira* and causes significant morbidity and mortality worldwide in wildlife, domestic animals, and humans. *Leptospira interrogans* serovar Pomona has been circulating endemically in the California sea lion (*Zalophus californianus*) population since at least the mid-1980s, causing yearly, seasonal outbreaks of varying magnitude. Using data and samples collected between 2010-19 we show that *L. interrogans* serovar Pomona disappeared from the California sea lion population in 2013 and re-emerged in 2017. We provide multiple lines of evidence that the combined actions of host demography and seasonal movement patterns – both perturbed by oceanographic anomalies – likely caused pathogen fadeout in the system and facilitated re-emergence. This is the first recorded example of spontaneous fadeout of an endemically circulating pathogen from a large, robust, host population. In a future where greater fluctuations in global climatic variables are predicted, and the impacts of zoonoses on wildlife and human populations are increasingly of concern, our study provides novel insights into how climatic and intrinsic host factors may interact to influence pathogen transmission and persistence in a natural system. In addition, it raises questions regarding *Leptospira* maintenance in the marine ecosystem in general. Evidence of *Leptospira* infection has been reported in a number of other eastern Pacific marine mammal species, raising important questions about whether these other species are infected by the same *Leptospira* lineage as found in CSL and how they may contribute to maintaining *Leptospira* in the marine ecosystem. Investigating the role of these other marine mammals in these complicated disease dynamics is a focus of our work moving forward.