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### Biology Summary Paper: Free Ranging California Sea Lions

Free-ranging baby California sea lions were getting leptospirosis, where were the sea lions getting this bacterium? This was the question many biologists were asking. For many years diseases and infections (much like this one) has not really been understood by anyone. For this study many different laboratories and departments came together to make all of this research happen. But what exactly were they looking for? They wanted to understand how the free-ranging California sea lions were getting leptospirosis. To do this they had to test if the pools the sea lions were wading in had an effect of the outburst of leptospirosis. They also wanted to learn if the infection could have an impact on the fisherman, residents, and tourists that interacted with the sea lions. Understanding if the infection could affect the community could be the difference of saving a person or an animal's life.

First off we need to know what *Leptospira interrogans* infection is to be able to understand what the biologist were looking for. It's an infectious bacterium that is found in animals but can be transmitted to humans. We learned this in the article because the sea lions have this infection and they are worried of it being transmitted to humans. This infection is capable of doing many things to sea lions and humans. One of the many affects leptospira has on the sea lions are it causes premature birth defects. The many birth defects are one of the main reasons why they want to study this disease on the sea lions. Leptospirosis is brought on by bacteria we know as Syphilis. Syphilis does the same thing in sea lions that it does to humans. It enters a susceptible host and attacks membranes that deal with body fluids. These fluids include

urine, blood, and genital secretion. The syphilis in the genital secretion is the reason for the premature birth defects.

The biologist had to do many different studies to find out why the pups were getting this infection. To do so they studied the pups on the Gulf of California in the year 2000 during the sea lions reproductive season. They did this at seven different locations along the Gulf of California. At first they took the pups weight, blood, and urine samples. They took those samples and did a polymerase chain reactions test on them. A polymerase chain reaction test is used to amplify one or many copies of a piece of DNA, generating thousands to millions of copies of a particular DNA sequence. In doing this the biologists can find the diagnosis of hereditary disease, or find the detection and diagnosis of infectious diseases. Then the biologists chose five random pools from those seven different locations, where the breeding colony sea lions lived, and took samples of the water that they wade in.

Now the question comes back up, where could these sea lions be getting *Leptospira*? The tests results proved that the pools are not a likely source for the infection. However, they found the antibodies to be greatest at the higher north pool. The lowest antibodies were at the lower south pools. 46 out of the 96 pups were seropositive on the microscopic agglutination tests. This means that 46 of the pups were tested positive for *Leptospira*. The biologists found that the production and building up of antibody were found the most during the infectious stage. To build antibodies is dependent on the host to build an immune response that can come from sex, genetics, and nutrition. For those free ranging pups the antibodies are probably from their mother during birth. Where the infection to the California sea lions is coming from is unknown. The transmission of the infection from the mothers to the pups are not likely from the mother's milk. The pups may have contracted it in the utero of their mother. The pups also could get it

from the breeding colony pools from an infected sea lion urinating in them during the first week of infection. The sea lions can transmit Leptospire from their urine up to 154 days after infection. The pools might not be a likely source but they can't be eliminated completely. The water temperature and the salinity level could have ruined the test results. Where Leptospirosis infection is coming from is still unknown. But the biologists and scientists found a ton of useful results that can be used in further studies of the California sea lions.