Hawaiian coastlines and nearshore waters are enjoyed by millions of people every year, but the ocean waters can be dangerous. One of the less commonly known risks is illness due to *Staphylococcus aureus* bacteria, also known as staph infection. Some staph strains are resistant to common antibiotics, and these methicillin-resistant *S. aureus* (or MRSA) can create serious and long-lasting health problems for people who become infected. Hawai‘i actually leads the U.S. in hospitalizations for MRSA related-illness. MRSA is commonly associated with hospital stays, but when ocean waters contain the bacteria even surfers, swimmers, and other recreational ocean users could be infected simply by being in the water. Climate change in Hawai‘i is predicted to include higher temperatures as well as more extreme rainfall events, which may increase MRSA abundance in the ocean.

Our work looks at the relationship between *S. aureus* abundance in Hilo Bay, hospital-reported infection rates, and weather conditions. We have determined that *Staphylococcus aureus* and methicillin-resistant *S. aureus* (MRSA) abundance are
positively correlated with rainfall. The abundance of these bacteria is also being determined in soils, sands, rivers, cesspools, and storm waters within the Hilo watershed, to identify sources of these pathogens to recreational waters. Additionally, MRSA infection rates at the Hilo Medical Center are being compared with rainfall events, to assess if community members are more at risk of these infections during the wet season. These data will provide foundational information on how \textit{S. aureus} and MRSA abundance will respond to a changing climate, and help guide solutions to manage the transport of such pathogens to coastal waters.

Public health issues with MRSA in nearshore waters mean that we need to have a good understanding of what factors increase the bacterial load in the water, both so that people can be protected and so that the sources of the bacteria can be better managed. This project involves collaborators from the Hawaii DLNR as well as Hilo Hospital and the community at large. Ideally we can develop a predictive model of how pathogen load varies in relation with rainfall, which will allow us to provide more information to beach goers and decrease the risks of staph and MRSA infections.

**Quick Summary**

- Hawai‘i has high rates of hospitalizations due to \textit{Staphylococcus aureus}-related illness, and nearshore ocean waters can contain \textit{S. aureus} including antibiotic-resistant forms such as MRSA. Understanding the relationship between local weather patterns, staph and MRSA abundance, and infections presenting at the hospital is crucial to making decisions about how to keep ocean visitors safer.

- Our work involves assessing the staph and MRSA abundance in various areas throughout the Hilo watershed, and combining that with rainfall data and hospital records to determine the sources of the pathogens and how the weather is related to bacterial movement in the watershed as well as infection rates.

- Our goal is to create a predictive model of pathogen movement so that we can focus efforts on decreasing \textit{S. aureus} load into nearshore waters even as the climate changes. We also hope to be able to provide outreach to the community about \textit{S. aureus} infection risks, allowing them to be able to make more informed decisions about their health when going into the ocean.