Investigating Relationships between Air Quality and Environmental Persistence of Fecal Indicator Bacteria at Recreational Beaches: A Molecular MST Approach

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Despite numerous cases of beach bacteria affecting millions of people worldwide the persistence of the bacteria populations in coastal areas is still not well understood. The purpose of this study was to test the levels of persistence of Enterococci, Escherichia Coli, and Human Bacteroidales within the “swash zone” and waist zone in which people commonly bathe and play. In addition, the study sought to determine if the bacterial components in the beach are similar to those found in the air. Solar insolation in relation to bacterial persistence in seaweed was used to determine if sunlight plays a role in modifying concentrations of bacteria. Air quality measured by a solar photometer was compared to varying locations where the beach samples were collected. Results demonstrate that bacteria measured using plate counts and qPCR were indeed higher within the swash zone than in the waist zone. This is in contrast with the way that the EPA currently measures and determines the public safety of beach waters. They commonly measure the waist zone, but disregard the swash zone. This emphasizes the need to collect samples from the entire beach instead of just measuring at an isolated area. It was further identified that the bacteria from both wrack and water matched in quantity to the air measurements. Thus, the data reveals a potential way to identify harmful levels of bacteria and dangerous levels of poor air quality at recreational beaches. These results expound the need for the EPA to measure not only the air quality, but also varying depths of water, which can be extremely beneficial to spare people from microbial contamination risk.

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