Human activity influences beach bacterial diversity

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Human activity influences ocean beach bacterial communities, and bacterial diversity may indicate greater ecological health and resiliency to sewage contamination, according to results published March 5, 2014, in the open access journal *PLOS ONE* by Elizabeth Halliday from Woods Hole Oceanographic Institution and colleagues.

Beaches all contain bacteria, but some bacteria are usually from sewage and may contaminate the water, posing a public health risk. In this study, scientists studied bacterial community composition at two distant beaches (Avalon, California, and Provincetown, Massachusetts) during levels of normal- and high-contamination (measured using a fecal or 'poop' indicator) by genetically sequencing over 600,000 bacteria from 24 dry sand, intertidal sand, and overlying water sampling sites at the locations. Waters at the Avalon site frequently violate water quality standards, while waters at the Provincetown site have infrequent water quality violations.

Scientists found distinct differences between the overall bacterial community compositions, but there was similarity in the bacterial community between coastal water samples from the two sites. When sequences for alternative fecal indicator bacteria were examined, the water and sand profiles were more similar at the same site, suggesting regional differences in human impacts. At Provincetown, a greater difference in bacterial communities was found from the dry and wet sands, likely due to a greater range between high and low tide. Provincetown samples also showed generally greater bacterial diversity

than those from Avalon, suggesting better ecological health and resiliency at that site.

Further understanding of how bacterial communities impact beach water quality is needed, but eventually, we may be able to document beach health in terms of the local bacterial community composition.

Dr. Gast added, "Recreational beaches are important to the economies of many coastal towns, and understanding the causes and impacts of beach water quality violations is important in managing the problem. This work provides insight into environmental bacterial communities during putative contamination events, reflecting the potentially different sources of material."

More information: Halliday E, McLellan SL, Amaral-Zettler LA, Sogin ML, Gast RJ (2014) Comparison of Bacterial Communities in Sands and Water at Beaches with Bacterial Water Quality Violations. *PLoS ONE* 9(3): e90815. DOI: 10.1371/journal.pone.0090815

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