Invisible Groundwater Discharge Patterns Across Tumon Bay, Guam: Discovery of Vital Habitats Sustained by Tumon Bay Karst Watershed Discharges From an Uplifted Carbonate Aquifer

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Current research shows Northern Guam to be composed of porous limestone bedrock which allow groundwater to flow out. One large discharge point has already been identified last year in north-western Guam at Ayuyu Cave. However, little is known about Tumon Bay which is full of karst watersheds. This project examined invisible groundwater discharge using a salinity meter and found two areas of concentrated freshwater discharges in Tumon Bay, with a few minor ones scattered throughout the bay. These seeps were found to have consistently lower salinity while pH varied. Unique coral growth in Tumon Bay's inner lagoon was associated with these two freshwater discharges with the pH levels further segregating the types of coral species found during on-site observation. Two coral communities, staghorn Acropora and massive Porites, were found adjacent to the surveyed groundwater seeps. It's inferred that lower wave energy in eastern Tumon Bay allows for greater plankton and other microbial growth leading to more heterotrophic coral growth, favoring Porites corals. Western Tumon Bay has higher wave energy which leads to the growth of more autotrophic corals, such as the Acropora found in the first area surveyed. This is the first study to document the presence, location, and consequences of invisible freshwater discharges across the billion-dollar bay. These discoveries allow for strategic coral planting, designated areas needing government protection, and show areas of appealing inner lagoon coral growth for tourism.

Awards Won:

National Oceanic and Atmospheric Administration - NOAA: Judges' Award