Step 1: Sand Crab Surveys- Overview

At all sites sand crab abundance was estimated by sampling within three transects located between the distributional boundaries of the swash zone (between the high tide strand line and the lower end of the swash zone). Transects were randomly spaced within one-hundred meters of the beach entry point and cores (10 cm diameter, 10 cm deep) were taken at uniform intervals of 0.25 to 1 meter depending on whether the width of the swash zone was narrow or wide, respectively. Cores from each transect were pooled and placed in a mesh bag for sieving. When sampling at Samoa SMCA, individual sand crabs were counted from each sampling transect, assigned a size category (small <10mm; 10mm< medium <15mm; or large >15mm), then released at the site of capture. No other measurements were taken on individuals from the SMCA to avoid injury of sand crabs before release. In contrast, at the reference sites all individuals from each sampling transect were retained and placed in Ziplock bags, chilled on ice, and processed at the Telonicher Marine Lab (TML) to measure carapace lengths with calipers to the nearest mm. For both SMCA and reference sites, relative abundances were calculated by averaging across the three transects. To calculate the abundance of sand crabs within individual transects the total transect catch was multiplied by the core spacing, and then dividing by the area of the core taken. The biomass of individual sand crabs was calculated for reference sites by using a weight-length model \( W= aL^b \) generated by measuring the carapace lengths and weight of 77 individual sand crabs collected from Gold Bluffs Beach in August, 2015. Relative biomass was estimated by using the same formula as relative abundance, except that total biomass per transect is used instead of total catch. Beach morphology was examined by taking monthly slope measurements and sand samples of the beach at the water table outcrop.