



Figure S1. Canonical analysis of principal coordinates (CAP) constrained ordinations for the fish data from the 80 survey sites based on Bray-Curtis similarity of square-root transformed fish abundance. CAP analysis showed strong correlations between the assemblage structure and the three explanatory variables: standardized mean VRM at 1-cm resolution (VRM 1 cm), standardized mean VRM deviation at 4-cm resolution (VRM 4 cm) and standardized curvature range (curvature range). The three canonical axes had squared canonical correlations of $\delta^2 = 0.83$, $\delta^2 = 0.63$ and $\delta^2 = 0.52$ using $m = 26$ coordinate axes that explained 97.1% of the variability in the original assemblage structure data. **(a)** The constrained CAP ordination using the first and second axes (CAP1 and CAP2) with vector overlays for fish species with multiple partial correlations > 0.3 showed that the abundances of *Chlorurus spilurus* and *Ctenochaetus strigosus* were positively correlated with the mean VRM at 1-cm resolution and mean VRM deviation at 4-cm resolution. The abundance of *Acanthurus triostegus* was positively correlated with the mean VRM deviation at 4-cm resolution and curvature range. **(b)** The constrained CAP ordination using the first and third axes (CAP1 and CAP3) with vector overlays additionally showed that the abundance of *Thalassoma ballieui* was positively correlated with the curvature range. The abundance of *Chromis vanderbilti* was negatively correlated with the mean VRM at 1-cm resolution and mean VRM deviation at 4-cm resolution.