Authors: Kayelyn Simmons[1] ksimmon2@ncsu.edu, Dr. DelWayne
Bohnenstiehl[1] drbohnen@ncsu.edu, Dr. David Eggleston[1] dbeggles@ncsu.edu
1 North Carolina State University, MEAS Department

Title: Evaluating the Efficacy of Management Zones in the FKNMS: Integrating Visual &
Photogrammetric Surveys and Passive Acoustics to Characterize Reef Fish Assemblages and
Spawning Activity across Coral Reef Management Regimes

Abstract – New technological approaches in marine ecology, such as (1) passive
acoustics to characterize underwater soundscapes, and (2) habitat photogrammetry,
which provides high-res, 3D images of habitats, can facilitate efficient and accurate
assessments of coral reefs. In collaboration with the Florida Fish & Wildlife
Conservation Commission (FWCC) and NOAA's National Marine Sanctuary Program
(NMSP), multidisciplinary, non-invasive research approaches provide
transformative ways to characterize reef fish biodiversity as well as the ecological
function of essential, hard-bottom habitats. The Florida Keys National Marine Sanctuary
(FKNMS) is an ideal study system due to several replicate marine reserve types in
addition to existing historical data on reef fish and benthic communities. Underwater
soundscape results show significantly different spectral patterns for each site, such that
protected sites displayed higher average spectra in low frequencies than fished sites.
Additionally, species and family-specific fish chorusing was identified during crepuscular
hours at several protected sites. Photogrammetry surveys produced a 3D elevation
model used to characterize differences in coral composition contributing to vertical
relief. Initial results suggest biodiversity and other ecosystem metrics generally increase
with level of protection. These data provide critical baseline evaluations for Post-
Hurricane Irma impacts and may assist in monitoring the recovery of coral reefs.