CNMI Long-term Marine Monitoring Program

Overview

Currently, the LTMMP has ~50 long-term monitoring sites across Saipan, Tinian, and Rota that are surveyed on a rotating biennial basis. Three main habitat types are covered: Fore reef, reef flat (lagoon), and seagrass beds (lagoon). Most sites have been selected based on their association with management concerns (runoff, sewage outfalls, urban development, etc.) and/or management actions (watershed restorations efforts, marine protected areas, etc.) and include impacted sites and relatively non-impacted reference sites. In general, monitoring surveys are conducted using standard and proven ecological field survey methods. All surveys are conducted along 3-5, 50 m transect lines laid out along the depth contour (~9m depth) on the fore reef, or along consistent habitat in the lagoon (back reef and seagrass). While benthic cover analysis provides the foundation of the CNMI monitoring program, the current protocol uses several survey types per site to provide ecological depth beyond percent cover.

Fore Reef

Photos are taken every meter along each transect line using a 0.25m^2 quadrat frame, for a total of 250 photos at each site. In the office, the computer program CPCe is used to place five random points on each photo and the biota or substrate type under each point is identified. Organisms are identified to the genus level. This analysis provides benthic percent cover and community diversity. Twelve, 3 minute, 5 m radius stationary point counts (SPC) are conducted at each site to evaluate fish assemblages. Each SPC is systematically positioned throughout the length of a site (250 m). The species and size (fork length) of all food fishes within the 5 meter radius are recorded. This provides relative diversity, abundances, species compositions, size class distribution, and biomass of the fish community. Sixteen 0.25m^2 quadrats are haphazardly tossed along the length of the site and every coral colony within the quadrats is identified to the species level and measured. This method provides relative diversity, abundances, species composition, and size class of the coral community. Within these same quadrats, all algae species present are identified to the species level to provide a measure of algae community composition and species richness. Finally, non-coral macro-invertebrates including sea cucumbers, urchins, crown-of-thorns starfish, giant clams, among others, are identified and counted within 1 m of each side of the transect lines (i.e. 5, 2mx50m belt transects). This provides invertebrate abundances, species composition, and diversity.

Saipan Lagoon

Saipan Lagoon habitats that are monitored include *Halodule uninervis* beds, staghorn *Acropora* thickets, and mixed coral back reefs. At lagoon sites, benthic cover is quantified using a 0.25 m^2 string quadrat with six intersections, placed every meter along the transect line. The biota or substrate under each intersection is recorded to the genus level, *in situ*. Additionally, 10, 1 m^2 quads are haphazardly placed across the length of the site (250 m) and all seagrass, algae, coral, and macro-invertebrates are identified to the species level and recorded. This method captures the relative diversity, abundance, and species compositions of lagoon communities. Finally, non-coral macro-invertebrate abundances and diversity are quantified as described above for reef slope sites.