From Habitats to Corals to Fishes: NOAA's Coral Reef Monitoring Program, Methodologies, and Potential as a Caribbean-wide Tool for Fishery-independent Sampling

De Hábitats a Corales y Peces: El Programa de Monitoreo de Arrecifes de Coral, las Metodologías y el Potencial de NOAA como una Herramienta en Todo el Caribe para el Muestreo Independiente de la Pesca

Des Habitats aux Coraux et aux Poissons: Programme de Surveillance des Récifs Coralliens de la NOAA, Méthodologies et Potentiel en tant qu'Outil Pan-Caribéen pour un Échantillonnage Indépendant de la Pêche

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EXTENDED ABSTRACT

In the Gulf and Caribbean, many coral reef ecosystems are ecologically and evolutionarily linked but few have long-term coral ecosystem monitoring programs that are independent of political, cultural, or areal boundaries. Of the programs that do exist, most are limited in scope, scale, or not designed to answer the multi-scalar questions that must be addressed to solve ecosystem-level problems. For example, most programs focus on sampling sites with high visibility or sites that fit into a general habitat type, often resulting in disparate samping among habitat types (Kramer and Lang 2003). To address this issue, NOAA Fisheries and National Ocean Service developed a suite of monitoring tools under the National Coral Reef Monitoring Program (NCRMP) to provide a simplified approach to long-term monitoring of coral reefs at the ecosystem level, providing information on fish, coral, and habitats (Brandt et al. 2009, Smith et al. 2011). Initially established for fish monitoring, then later expanded to corals, these methods exploit habitat-organism relationships to provide an iterative, stratified random sampling design using an optimal sample allocation approach (Figure 1). Because organisms of interest may vary by location, these methods are appropriate for species and functional groups, making multi-scalar comparisons possible (Smith et al. 2011). Here, we describe the history, methods, and resources that the NCRMP could provide for standardizing sampling programs across the Gulf and Caribbean. Improvements in standardization could aid in the understanding of basin-wide ecological drivers, ecosystem evaluation, fishery management, sanctuary efficacy, habitat conservation, and enhance uniformity of the Global Coral Reef Monitoring Network for reporting and product development.

KEYWORDS: Long-term monitoring, reef, survey design, coral reef

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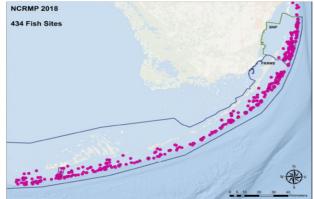
Figure 1. Location of National Coral Reef Monitoring Program (NCRMP) sampling locations for fishes in the Florida Keys in 2018 (n = 435).