IX. Conclusions and Future Work

Survey results from 2010 add to a growing dataset on the distribution, abundance, size, and condition of benthic coral reef organisms in the Florida Keys National Marine Sanctuary. For many of the variables assessed, we have now developed an 11-year record dating back to 1999 to evaluate benthic community structure in no-take zones throughout the Sanctuary, within the context of larger-scale environmental variability of coral reef and hard-bottom habitats on the south Florida shelf. Benthic surveys completed in 2010 included a follow-up effort, albeit within the upper Keys region, for *Acropora* corals, urchins, anemones, corallimorpharians, selected mollusks, and marine debris. In addition, we were able to sample several nine sites in three depth intervals across Conch Reef to continue a time-series for that reef area. We are in the process of analyzing temporal trends in benthic organisms and community structure throughout the Sanctuary and evaluating the responses of the benthic community to protection from fishing the 23 no-take zones from Key Largo to Key West.

The cumulative results of our program define baseline conditions for coral reef community structure throughout the FKNMS and Dry Tortugas, including marine protected areas. However, sampling only began in 1999 and thus represents an effort established after major declines had already occurred throughout the system, especially related to the loss of *Acropora* corals from disease, the demise of the urchin *Diadema antillarum*, coral bleaching, and various other stressors that impact this ecosystem. To address the lack of a longer temporal framework of our program, we have an unprecedented opportunity to integrate our work with results from an unpublished NSF-funded project conducted in the 1970s. Specifically, we are partnering with the FKNMS, through B. Precht and his damage assessment team, to compare and extend work first started by Dr. Don Kissling in the early 1970s, when Dr. Kissling and his students completed over 190 days of underwater field studies from June 1970 to January 1974. Over 1,000 pages of field notes and data were compiled, reporting on the hydrological, sedimentological and ecological elements of nine reefs located from Looe Key to Sand Key. Kissling's data indicate diverse living coral assemblages. In addition, hundreds of black-and-white and color photographs were cataloged. In 1978, Dr. Kissling retired unexpectedly from academia, and this treasure trove of data has sat idle for over 30 years. Dr. Kissling has agreed to work with us to publish and resample the sites he visited over 30 years ago. The comparative work will be based on our on-going, long-term monitoring protocols, as well as additional work to resample the parameters he measured that are not presently included in our sampling program (e.g. brittle stars and sediments). In general, publications from this work will be based on comparisons of these reefs after three decades of decline, including what was lost and why. Other elements of this data rescue element include preparation of database files for publication on our website and digitizing photographs for archival purposes.

In 2011, we are coordinating a region-wide assessment of *Acropora* corals in U.S. territorial waters, including southeast Florida, the U.S. Virgin Islands, and Puerto Rico. We plan to survey *Acropora* corals for abundance, size, and condition throughout a large section of the Florida Keys, specifically from northern Biscayne National Park to near the Marquesas region. In addition, urchins, anemones/corallimorpharians, selected mollusks, and marine debris will be sampled Keyswide. We will also be coordinating similar efforts in the U.S. Caribbean to identify to develop abundance estimates structured by colony size and habitat type.

In 2011-2012, we plan to collaborate further with Nancy Sheridan of the Florida Fish & Wildlife Research Institute to sample ocean-side and nearshore-Florida Bay-Biscayne Bay hard-bottom and seagrass matrix habitats for benthic community structure, with a focus on several species targeted by the marine ornamental trade. Along with fishery-dependent data on landings and aggregation locations, these data will provide both fishery-dependent and independent population assessments of targeted species. This will also provide an unprecedented data set from nearshore to offshore habitats for evaluating population status of benthic organisms that provides a framework for monitoring trends over time.

In 2010-2011, we will also continue to analyze data and prepare publications. Of particular note is work related to our now 11-year record of surveys in the FKNMS and additional multivariate work related to the distribution and abundance of species and habitat types throughout the region. The data set provides unprecedented spatial coverage of organism habitat distribution, density, and size, as well as a means to evaluate temporal changes related to the FKNMS zoning action plan relative to larger-scale phenomena.

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