

# DEVELOPING A BIOLOGICAL CONDITION GRADIENT FOR THE PROTECTION OF PUERTO RICO'S CORAL REEFS

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We introduce the application of the Biological Condition Gradient (BCG) to coral reefs: a conceptual model that describes how biological attributes of coral reef ecosystems might change along a gradient of increasing anthropogenic stress. Under authority of the Clean Water Act, the U.S. Environmental Protection Agency (EPA) is committed to protecting the biological integrity of the nation's waters, including marine coastal habitats such as mangroves, seagrasses and coral reefs. EPA has assembled a workgroup of 30 coral reef experts to develop the BCG for Puerto Rico's coral reefs. We anticipate that this BCG will be broadly applicable to Caribbean reefs, and that the process and framework can be transferred to other geographic regions.

During a series of facilitated workshops and webinars these experts examined photos, videos and datasets to define ten attributes of reef condition. Each attribute provided information about the biological condition of a coral reef (including aspects of community structure, organism condition, and ecosystem function and connectivity). The experts used those attributes to define levels of biological condition along an anthropogenic stressor gradient, including a set of criteria to identify reference condition as a natural fully functioning system of reef organisms and communities.

Results of this research include: 1) the BCG model for coral reef ecosystems, 2) a database of coral reef species for Puerto Rico and USVI that includes tolerances/sensitivities to various stressors, and 3) a publically available coral reef database for Puerto Rico and USVI survey data (residing on EPA's STORET Data Warehouse) that includes original data, a 'crosswalk' to move between data with different collection methods, and the final standardized data).

Managers can use this BCG framework to: define biological expectations, interpret current condition of sites relative to management goals, track ecosystem responses to management actions and communicate environmental condition and outcomes to the public.

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