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Coral reefs support more species than any other marine ecosystem on earth. Recent and unprecented increases in ocean temperatures have had significant social, economic, and environmental impacts. Yet, we still have a poor understanding of the fundamental processes and dynamics on reefs. We mathematically defined three vital population parameters: growth, partial mortality, and total mortality to further our understanding of how these rates affect coral population dynamics. Two approaches have produced general trends for these parameters using initial colony size to define (1) relative growth rates and (2) probability density functions. Functional relationships were determined between growth rate and initial colony size using curve fitting analysis, least-squares approximation and probability functions. Further analyses are underway to (1) determine the relationships between growth rates and corals' initial perimeter, and (2) develop differential equations in modeling the coral population using initial size and these vital population parameters. (Received September 22, 2009)