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Abstract: A baseline assessment of 35 economically and ecologically important Florida Keys reef fish stocks is provided by using a systems approach that integrates sampling, statistics, and mathematical modeling. Quantitative fishery-independent data from reef fish visual surveys conducted by SCUBA divers from 1979 to 1996 were used to develop estimates of population abundance, assemblage composition, and stock structures in relation to key physical and habitat factors. Exploitation effects were assessed with a new length-based algorithm that calculates total mortality rates from estimates of "average length of fish in the exploitable phase of the stock." These estimates were highly correlated for two statistically independent data sources on reef fish: fishery-independent diver observations and fishery-dependent head boat catches. We developed a reef fish equilibrium exploitation fishery simulation (REEFS) model and used estimates of fishing mortality to assess yield-per-recruit in relation to fishing intensity and gear selectivity and to assess spawning potential ratio (SPR) in relation to U.S. federal "overfishing" standards. Our analyses show that 13 of 16 groupers (Epinephelinae), 7 of 13 snappers (Lutjanidae), one wrasse (Labridae), and 2 of 5 grunts (Haemulidae) are below the 30% SPR overfishing minimum. Some stocks appear to have been chronically overfished since the late 1970s. The Florida Keys reef fishery exhibits classic "serial overfishing" in which the largest, most desirable, and vulnerable species are depleted by fishing. Rapid growth of the barracuda population (Sphyraenidae) during the same period suggests that fishing has contributed to substantial changes in community structure and dynamics.