GREEN TURTLE GROWTH RATES: EVIDENCE FOR A DENSITY-DEPENDENT EFFECT AND CARIBBEAN-PACIFIC DIFFERENCES

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Growth rates of immature green turtles were evaluated with nonparametric regression models for data collected during an 18 year study in Union Creek, a wildlife preserve in the southern Bahamas. We addressed three questions: (1) do growth rates change with population density; (2) are movements of green turtles from a low quality area to a high quality area associated with decreased growth rates; and (3) are there differences in the growth functions for green turtle populations in the Greater Caribbean and in the Pacific Ocean?

GREEN TURTLE NESTING AT TORTUGUERO, COSTA RICA: AN ENCOURAGING TREND

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The green turtle population that nests at Tortuguero, Costa Rica, is the largest in the Atlantic. Twenty-six years of survey data are analyzed from 1971-1996. Annual estimates of nesting emergences were derived by fitting a cubic smoothing spline to survey track counts using the Generalized Additive Model function and integrating over the entire season. The cubic spline procedure was also used to smooth the 26-year time series of annual nesting emergences. Trends reported in this study are discussed in the context of the shifting baseline syndrome and must be evaluated with caution.

MODELLING THE SUSTAINABILITY OF SEA TURTLE EGG HARVESTS IN A STOCHASTIC ENVIRONMENT

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I have developed a stochastic simulation model for loggerheads (*Caretta caretta*) comprising the southern Great Barrier Reef stock. The model was designed to support risk-based evaluation of (1) trawl fishery impacts on stock viability given competing mortality risks (Chaloupka and Limpus, 1998a) and (2) egg harvesting policies given environmental stochasticity and management uncertainty.

METHODS

The model used finite difference equations linked with dynamic vital rates characterised by nonlinear, time variant, distributed lag and stochastic properties. It comprised a stage-structured demography comprising both age-based and reproductive status-based stages (see Chaloupka and Limpus, 1996 for concept). Mortality rates were derived from (1) known hatching rates (Limpus *et al.*, 1994), (2) proxy hatchling mortality estimates for green sea turtles from the same sGBR location (see Chaloupka and Limpus, 1998a) and (3) multinomial CJS statistical modelling of immature and adult sGBR loggerhead sex-specific survival rates (see Chaloupka and Limpus, 1998b). Demographic stochasticity was included with stage-specific logistic pdfs reflecting 95% confidence interval estimates of survival rates. Environmental stochasticity was included by a 2-state stochastic breeding likelihood function derived from empirical breeding rates