Additional runs of ASPIC model for Caribbean lobster

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Introduction

During the review of the assessment the review panel noted the discrepancy in the information content for different time periods of the available time series. It was particularly puzzling that data for 1969-1989 (equivalent to the data available during the assessment conducted in 1990 by Bohnsack et al. 1991) seem to be consistent with a surplus production model as reported by Bohnsack et al (1991) however, data for the period after that were not and were the reason why the current assessment was unable to produce an acceptable fit of the surplus production model.

The panel therefore requested that an ASPIC fit to the data available for the period 1969-1989 was conducted to check that the new data series available at the present assessment (standardized indices of abundance) were still consistent with the results obtained by Bohnsack et al (1991).

The following data were used for the ASPIC fit: Landings for 1969-1989, standardized index of abundance from the St. Croix dive fishery and the St. Thomas St. John Trap fishery for 1974-1986 and the nominal cpue (annual catch per total number of traps) for the Puerto Rico fishery for 1969-1989.

Fits were conducted with the same initial values and constraints used in the fits reported in the SEDAR 8 assessment report. Fits were able to estimate the initial biomass ratio but the resulting estimated parameters were not very different (B1/K = 2.2, r = 0.105) to those obtained when the initial biomass ratio was set to 2.0 (r= 0.14) , assuming that the biomass was at virgin in 1969. The estimate of r for both fits was low, and for the fit where the initial biomass ratio was estimated it was close to the value of 0.1 used as a minimum constraint. Below (Table 1) are reported the results for the fit that assumes that the initial biomass ratio was 2.0.

The fit to the relative abundance indices of Puerto Rico and St Croix dive is relatively good but is rather poor to the St. Croix dive fishery, that unlike the other two indices, does not show a decline during the period (Figure 1).

The estimated ratio of Biomass in 1990 is 0.8, that is consistent with the result obtained by Bohnsack et al (1991) with the equilibrium production model that the fishery was starting to be overfished. This ratio is however greater than the MSST. The ratio of fishing mortality to the fishing mortality that produces MSY is 0.95, suggesting no overfishing was taken place in 1989.

This confirms the observations by the review panel that the data up to 1989 was consistent with the dynamics of a surplus production model, but the data after that not.

Reference cited

Bohnsack, J., S. Meyers, R. Appledoorn, J. Beets, D. Matos-Caraballo, and Y. Sadovy. 1991. Stock Assessment of Spiny Lobster, *Panulirus argus*, in the U.S. Caribbean. NMFS SEFSC-Miami Laboratory Contribution No. MIA-9C/91-49.

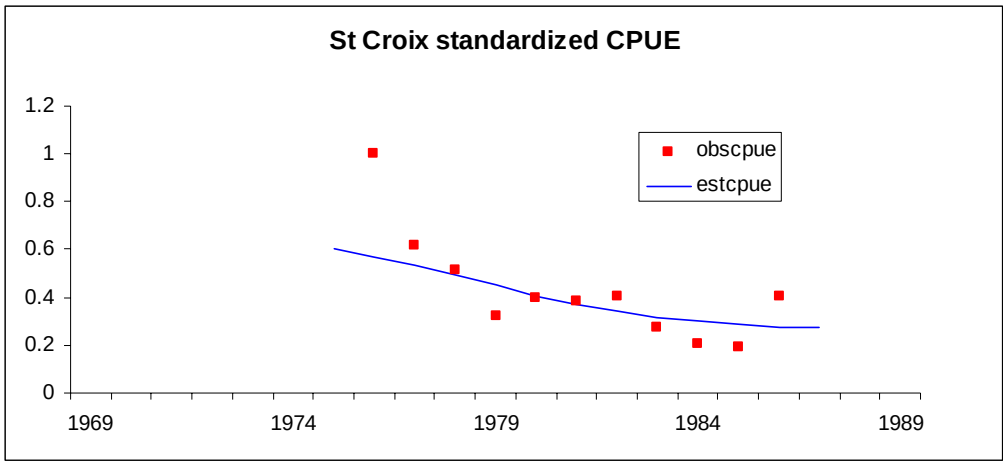
Table 1: ASPIC Fits for data for 1969-1989. Initial Biomass ratio not estimated, fixed to 2.0.

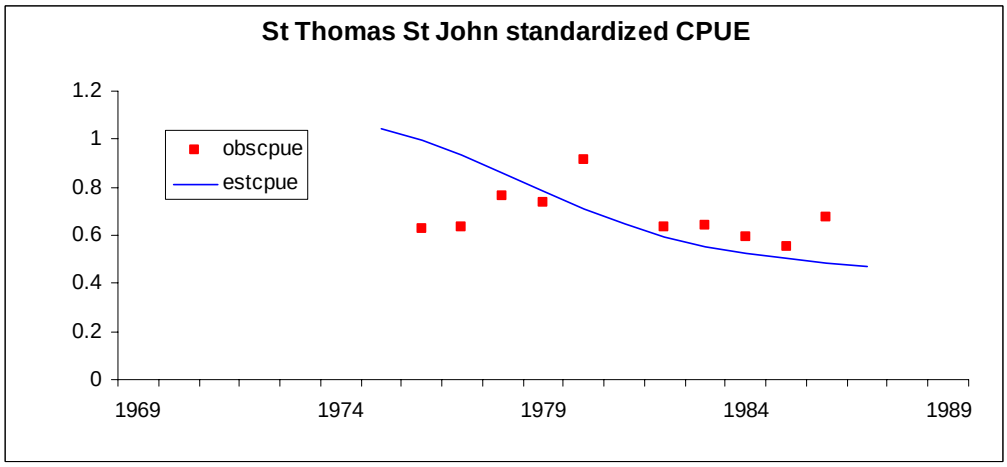
MODEL PARAMETER ESTIMATES (NON-BOOTSTRAPPED)

Parameter		Estimate	Starting guess	Estimated	User guess
B1R	Starting B/Bmsy, year 1969	2.000E+00	2.000E+00	0	1
MSY	Maximum sustainable yield	**247,500**	5.000E+05	1	1
r	Intrinsic rate of increase	**0.175**		1	1
.....	Catchability coefficients by fishery:				
q(1)	Puerto Rico nominal cpue in annual catc	1.514E-07	1.000E-01	1	1
q(2)	USVI Dive catches and standardised cpue	1.369E-07	8.000E-03	1	1
q(3)	USVI Trap catches and standardised cpue	2.377E-07	1.000E-01	1	1

MANAGEMENT PARAMETER ESTIMATES (NON-BOOTSTRAPPED)

Parameter		Estimate	Formula	Related quantity
MSY	Maximum sustainable yield	2.475E+05	Kr/4	
K	Maximum stock biomass	5.647E+06		
Bmsy	Stock biomass at MSY	2.823E+06	K/2	
Fmsy	Fishing mortality at MSY	8.764E-02	r/2	
F(0.1)	Management benchmark	7.888E-02	0.9*Fmsy	
Y(0.1)	Equilibrium yield at F(0.1)	2.450E+05	0.99*MSY	
B./Bmsy	Ratio of B(1990) to Bmsy	**0.80**		
F./Fmsy	Ratio of F(1989) to Fmsy	**0.95**		
F01-mult	Ratio of F(0.1) to F(1989)	0.95		
Ye./MSY	Proportion of MSY avail in 1990	9.592E-01	2*Br-Br^2	Ye(1990) = 2.374E+05





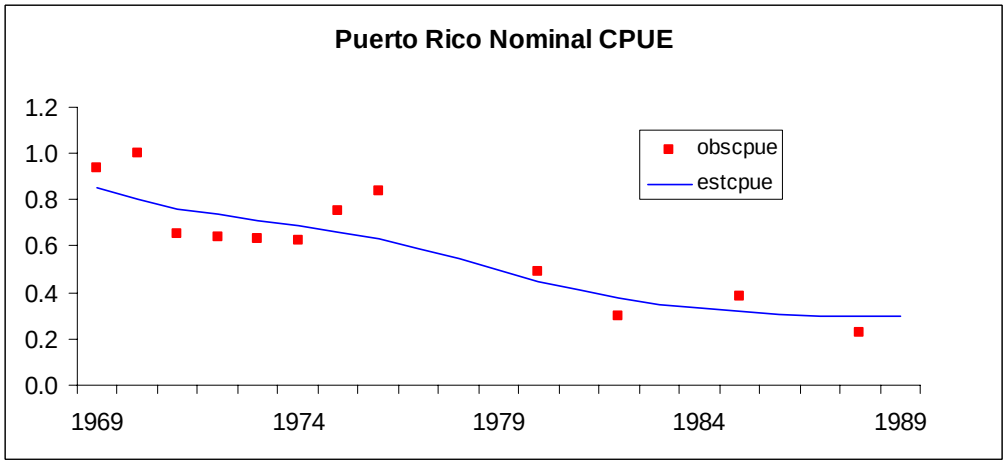


Figure 1: Estimated and observed abundance indices from ASPIC fit of data for 1969-1989 when the initial biomass ratio is set to 2,0.