Summary of Life History Information of Spiny Lobster for SEDAR 57

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Introduction

This document has been populated with life history parameters used in SEDAR 8 (2005; Caribbean spiny lobster) and/or SEDAR 46 (2016; Caribbean data-limited species). In preparation for the SEDAR 57 data workshop, the analysts have collected and summarized available literature, to their knowledge, to date. Two summary documents are available to the life history working group: FAO 2001 (S57_RD_05_FAO619.pdf), Saul 2004 (S57_RD_07_Saul_S8_Life_history.pdf). During the Data Workshop an excel summary titled Life history summary by region was also made available to participants.

Length-weight relationship

Using TIP data (1986-2003), a morphometric relationship was estimated as:

$$W_T = 0.00921 L_{CL}^{2.4804}$$

Where W is total weight in grams and L_{CL} is carapace length in mm (SEDAR 2005). This relationship was used in SEDAR 46. Analysts should consider analyzing L-W relationships using updated TIP database.

Natural Mortality

During SEDAR 8, various sources are referenced with respect to natural mortality, including Olsen and Koblic 1975, Medley and Ninnes 1996, and FAO 2001. Workshop participants are

encouraged to review Olsen and Koblic (available among the SEDAR 57 Reference Documents) and consider the validity of their estimates and the stated concerns about the reliability of these M estimates. Natural mortality was specified at 0.36 for adult lobsters and used for all ages in SEDAR 8.

During SEDAR 46 (Spiny lobster St. Thomas & St. Croix), consideration was given to natural mortality estimates from tagging studies, with estimates typically occurring between 0.26 and 0.44 $year^{-1}$ for adult spiny lobster, with the most reliable estimates suggested to be in the range of 0.30 to 0.40 (FAO 2001). A point estimate of 0.34, calculated from a variant of Pauly's equation, is also widely reported (Cruz et al. 1981). Point estimates based on longevity were also considered, but require evidence of maximum age, which is difficult to obtain for lobsters (Kanciruk 1980). This issue is reinforced by additional statements made by Olsen and Koblic (1975). A more detailed discussion about spiny lobster longevity can be found on pg 27, SEDAR 46, Data & Assessment Workshop report (SEDAR 2016). Several spiny lobster stock assessments in the Caribbean have used 0.34 to 0.36 $year^{-1}$ in base model runs (Cruz 2001; Gongora 2010; SEDAR 2005; Babcock et al. 2014).

Growth

During SEDAR 8, von Bertalanffy growth curves for males and females were obtained from Leon et al. (1994) from Cuba (SEDAR 2005). Newer publications are available for Cuba, Puerto Rico, and St. Croix, and can be found among the SEDAR 57 Reference Documents. During SEDAR 46 (Spiny lobster St. Thomas & St. Croix), von Bertalanffy growth parameters from Leon et al. (1995) were reviewed, noting their use in other stock assessment (i.e., Gongora 2010; Babcock et al. 2014). These point estimates were also compared to a more recent study by Leon et al. (2005). Chosen parameter applied as single growth for both sexes were $L\infty = 183.0$ mm CL, $K = 0.240$ $year^{-1}$, $t0 = 0.44$ yrs. Analysts should review the availability of growth information for Puerto Rico and the US Virgin Islands.

Maturity

Die (2005) estimated a logistic maturity curve from TIP prior to 1990, prior to which landing of berried females was permitted. Data from Puerto Rico, St. Thomas, and St. John were aggregated for the purpose of model fitting. Two model parameterizations were considered, in both cases, length at 50% maturity were similar being either 91 mm or 92 mm CL. Details of model fitting may be a relevant point of discussion. Please see Die (2005) among the SEDAR 57 Reference Documents.

Fecundity

For SEDAR 8 (2005), fecundity-at-length was obtained for Cuba spiny lobster (FAO 2001):

$$E = 0.5911 L_{CL}^{2.9866}$$

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