Interim Tilefish Projections

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Description of projections

This report describes projections of the U.S. South Atlantic tilefish population following the 2011 SEDAR 25 stock assessment. The results are intended to serve as interim deterministic estimates (e.g. first order approximation) until a more thorough treatment of the stochastic output can be completed.

Fishing mortality levels

At the last South Atlantic Fishery Management Council, Scientific and Statistical Committee meeting (November 2011), a P* (probability of overfishing) level of 35% was established for tilefish based on the ABC control rule. Using the results from the Monte-Carlo bootstrap (MCB) analysis from SEDAR 25, the distribution of F_{MSY} estimates suggested that F=0.1005 corresponds to a P* value of 35% (Figure 1). Figure 1 also shows other values of F and their corresponding P* values.

Projection Methods

Projections were run to predict stock status in years after the assessment, 2011-2020. The structure of the projection model was the same as that of the assessment model, and parameter estimates were those from the assessment. Fully selected F was apportioned between landings according to the selectivity curves averaged across fisheries, using geometric mean F from the last three years of the assessment period.

Central tendencies of SSB (time of peak spawning), F, recruits, and landings were represented by deterministic projections using parameter estimates from the base run. These projections were built on the estimated spawner-recruit relationship with bias correction, and were thus consistent with estimated benchmarks in the sense that long-term fishing at F_{MSY} would yield MSY from a stock size at SSB_{MSY}.

Point estimates of initial abundance at age in the projection (start of 2011), other than at age 1, were taken to be the 2010 estimates from the assessment, discounted by 2010 natural and fishing mortalities. The initial abundance at age 1 was computed using the estimated spawner-recruit model and a 2010 estimate of SSB.

Fishing rates or catch levels that define the projections were assumed to start in 2012, which is the earliest year management could react to this assessment. Because the assessment period ended in 2010, the projections required an initialization period (2011). Fishing mortality in 2011 was set equal to the amount yielding the estimate of the total 2011 landings.

The 2011 total landings were compiled from several sources as follows. Commercial landings were obtained from the accumulated landings system (399,664 lb whole wgt). Recreational landings were obtained from a website query of the MRFSS database, which resulted in an estimate of 9,824 fish harvested in Florida in 2011. Using an average weight estimate of 6.21 pounds whole weight (see August 14, 2009 Memorandum from the SEFSC to SERO), the MRFSS estimate of landings was computed as 61,007 (lb whole wgt). Headboat landings were assumed to be zero for this analysis. In the projection analysis, total landings of 460 (1000 lb whole wgt) were used for 2011.

Results

The results of the deterministic population projections with the constant *F* corresponding to P* = 35% suggest the population can handle an increase in fishing mortality from the 2011 estimate of 0.058 up to 0.1. This results in an increase in total landings to 789,000 (lb whole wgt) in 2012.

Year	F	SSB (mt)	R (1000 age-1)	L (1000 fish)	L (1000 lb ww)
2011	0.058	54.82	423	55	460
2012	0.1	57.76	425	93	789
2013	0.1	56.95	424	89	761
2014	0.1	55.92	423	85	737
2015	0.1	54.78	422	83	715
2016	0.1	53.63	422	81	696
2017	0.1	52.53	421	80	681
2018	0.1	51.51	420	78	667
2019	0.1	50.58	419	77	656
2020	0.1	49.75	418	76	646

The population projections indicate the recruitment, spawning biomass, and landings will all reach a peak in 2012 and then decline, in large part due to the increase in *F* from 0.058 in 2011 to 0.1 in 2012.

Specific comments on interim projections

Although the projection *F* was set equal to a P*=35% from the SEDAR 25 MCB analysis, this analysis is not consistent with a P* analysis in which the landings are set constant such that P*=35% in every year. It is likely P*≠35% in every year, with this difference increasing further into the future as uncertainty in population dynamics increases.

General comments on projections

As usual, projections should be interpreted in light of the model assumptions and key aspects of the data. Some major considerations are the following:

- In general, projections of fish stocks are highly uncertain, particularly in the long term (e.g., beyond 5-10 years).
- Although projections included many major sources of uncertainty, they did not include structural (model) uncertainty. That is, projection results are conditional on one set of functional forms used to describe population dynamics, selectivity, recruitment, etc.
- Fisheries were assumed to continue fishing at their estimated current proportions of total effort, using the estimated current selectivity patterns. New management regulations that alter those proportions or selectivities would likely affect projection results.
- The projections assumed that the estimated spawner-recruit relationship applies in the future. If future recruitment is characterized by runs of large or small year classes, possibly due to environmental or ecological conditions, stock trajectories may be affected.

Figure 1. Solid curve indicates the cumulative probability distribution of estimates of F_{MSY} from the Monte-Carlo bootstrap (MCB) analysis conducted as part of the SEDAR 25 stock assessment. Vertical lines indicate various estimates of F and their corresponding probability of overfishing (i.e. exceeding F_{MSY}).