Black Sea Bass Projections III

Prepared by the NOAA/NMFS Southeast Fisheries Science Center, Beaufort Laboratory
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1 Description of projections

This report describes projections requested in a memorandum from Dr. Crabtree to Dr. Ponwith. The memorandum requested an additional projection of black sea bass (southeast U.S. Atlantic). In this projection, $F = F_{\mathrm{MSY}}$ in 2012–2016, and F in 2011 was computed such that landings equaled 150% of the current quota (847,000 lb whole weight).

Methods used in these projections are described in the SEDAR-25 assessment report.

2 Results

Results are tabulated in Table 4.1 and are shown graphically in Figure 4.1.

3 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 (reproduced verbatim from the assessment report):

- 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 and that past residuals represent future uncertainty in recruitment. 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.
- Projections were based on the calendar year because they are extensions of the assessment model. A shift in the fishing year relative to calendar year may introduce some unquantified disconnect between projection results and management implementation. However, if quotas are reached each year prior to December 31, as might be expected, all fishing mortality within a fishing year would also occur within the same calendar year.

- Projections apply the Baranov catch equation to relate F and landings using a one-year time step, as in the assessment. The catch equation implicitly assumes that mortality occurs evenly throughout the year. This assumption is violated when seasonal closures are in effect, introducing additional and unquantified uncertainty into the projection results.
- The 2011 landings were expected to exceed the quota, but at the time of this assessment, the degree of overage is unknown. When that information becomes available, projections may need revision, as results were sensitive to 2011 landings in the L_{rebuild} and F_{rebuild} scenarios. Revised projections might additionally account for any Accountability Measures implemented in response to exceeding the 2011 quota.

4 Tables and Figures

Table 4.1. Projection results under a scenario with fishing mortality rate fixed at F_{MSY}, and with 2011 landings equal to 150% of the quota (847,000 lb*). F = fishing mortality rate (per year), Pr(*$SSB > SSB_{MSY}$*) = proportion of stochastic projection replicates exceeding* SSB_{MSY}*, SSB = spawning stock (1E10 eggs) at peak spawning time, R = recruits (1000 age-0 fish), D = discard mortalities (1000 fish or 1000* lb *whole weight), L = landings (1000 fish or 1000* lb *whole weight), and Sum L = cumulative landings (1000* lb*). For reference, estimated benchmarks are* $F_{MSY} = 0.698$ *(per yr),* $SSB_{MSY} = 248$ *(1E10 eggs), and* MSY = 1767 *(1000 lb). Expected values presented are from deterministic projections (klb = 1000 lb).*

Year	F(per yr)	Pr($SSB > SSB_{MSY}$)	SSB(1E10 eggs)	R(1000)	D(1000)	D(klb)	L(1000)	L(klb)	Sum L(klb)
2011	0.748	0.04	186.5	30,739	181	72	1651	1271	1271
2012	0.698	0.09	188.3	30,870	183	71	1529	1189	2460
2013	0.698	0.18	203.3	31,876	203	80	1644	1263	3723
2014	0.698	0.27	215.8	32,645	214	85	1830	1396	5119
2015	0.698	0.33	224.6	33,158	220	88	1947	1501	6620
2016	0.698	0.36	230.9	33,513	226	90	2021	1568	8188

Figure 4.1. Projection results under a scenario with 2011 landings at 150% of the current quota, and 2012–2016 fishing mortality rate at $F = F_{\mathrm{MSY}}$. Expected values represented by dotted solid lines, and uncertainty represented by thin lines corresponding to 5^{th} and 95^{th} percentiles of replicate projections. Horizontal lines mark MSY*-related quantities. Spawning stock (SSB) is at time of peak spawning.*